FACTORY

MANAGEMENT AND MAINTENANCE

AUGUST 1949

SPECIAL REPORTS

FACTORY's Bear-Down-on-Production-Cost Series
4. Make Fullest Use of Electrical Equipment 66
We Must Learn How to Manage Our "Phantom Factories" 94
Who's Going to Manage — You or the Union? 100

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Management and the Plant's Labor Hours 65

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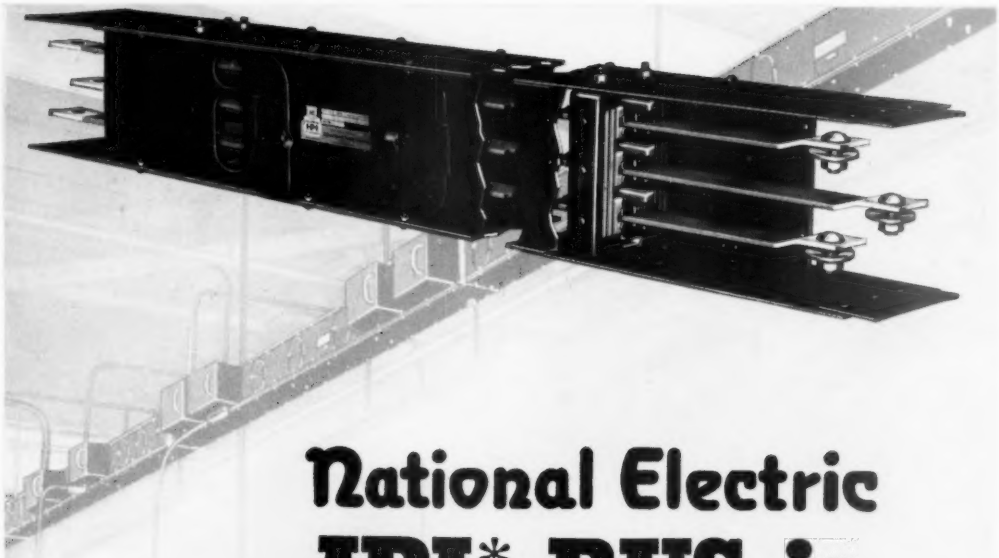
A McGRAW-HILL PUBLICATION



National Electric IPI* BUS is EASY to INSTALL

CHECK THESE ***ADDITIONAL*** ADVANTAGES!

√ CONVENIENCE—

National Electric Plug-In Busway can be used to bring your present electrical distribution system up to date, or can be added to existing installations.

Plug-In openings, spaced 15" on center on two sides of Busway, permits mounting Plug-In Devices every 7½".

√ FLEXIBILITY—

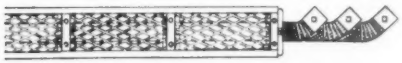
Busway can be mounted to permit installation of Plug-In Devices with standard ¼-20" screws on either side, or top and bottom.

√ ECONOMY—

Complete 100% salvability for alterations, additions, or relocation. Every foot of distribution system is usable.

***National Electric's Industrial Plug-In Bus is a completely self-contained electrical distribution system designed for quick, *simple* installation. Insulator bolts extending through the enclosure make suspension from ceiling or walls an easy job.**

Approved by Underwriters' Laboratories, Inc.



"Lo-Loss" Feeder Bus—specifically designed for transmission of current up to 4000 amp. at 600 volts or less. National **"Lo-Loss"** will do it economically and efficiently. Light in weight—compact in design. Easily installed because single bolt contacts are used.

Let us send you complete information. Write for our catalog "Busways by National Electric."

NATIONAL ELECTRIC PRODUCTS — WIRING SYSTEMS — WIRES AND CABLES

National Electric Products Corporation

1347 CHAMBER OF COMMERCE BUILDING • PITTSBURGH 19, PA.

Rubber muscles for jaws that chew rocks

A typical example of B. F. Goodrich product improvement

BY THE TIME it reaches the end of that roller coaster, a rock has become sand. Each climb carries it to a crusher that reduces its size—from big ones into little ones.

But the chains that drove that whole mass of equipment were always wearing out, and breaking. They had to be greased of course; the grease collected dust; the dust cut the chains. And when that mass of machinery stopped, costs mounted by the minute.

Rubber V belts were proposed, but the terrific loads would have stretched them into useless shape in no time. Just about then B. F. Goodrich developed a new kind of V belt—much stronger than other belts because of a new kind of reinforcement called a "grommet".

A B. F. Goodrich distributor suggested that the quarry owner replace the noisy, hard-to-maintain chain drives with these grommet belts. They were installed 7 years ago, have already lasted four times as long as the old-type drives, and are still going strong. They're clean and quiet—no grease or dirt, no clanking.

Improving products long considered "standard" is day-by-day work for B. F. Goodrich engineers. Every one of the thousands of BFG products is subject to continual research and experiment to improve the product or develop useful new applications of rubber for industry. Thousands of business men come to B. F. Goodrich first, sure that BFG has or will find the answer to their problems. *The B. F. Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

B.F.Goodrich
RUBBER FOR INDUSTRY

Time to re-live a memory?

Somewhere in every man's memory, half-hid by the veil of time, there's a scene like this. If it wasn't the thrill of catching your first fish, it might have been the day you first swam alone, or the day you first pulled the trigger of a shot gun, with somebody else shouldering the stock to absorb the kick. Exactly what it was doesn't matter. It was an unforgettable moment in your life.

Summertime makes those memories live again. A man wants to go back to those carefree, sunny days when a quick tug on the line, the old swimming hole, or a brand new fielder's glove was the only thing that mattered. So, you take a vacation. And you realize again that those simple pleasures, with the workaday world behind you, are almost as good as ever.

When you take your vacation this year remember that Ryerson stocks are again large and complete—and that service is immediate. Just tell the boys who pinch-hit for you while you're away to call our nearest plant for every steel requirement.

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • DETROIT • CINCINNATI
CLEVELAND • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO

FACTORY

MANAGEMENT and MAINTENANCE

AUGUST, 1949

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SHOCK-PROOF SHIPPING BOX

You can't take chances in shipping delicate, precision equipment. If such equipment is damaged in transit, your customer will probably look elsewhere the next time he places an order. Whatever your product, the H & D Package Laboratory can work out a safe, dependable, economical packaging method that will protect your goodwill . . . *and* your profits!

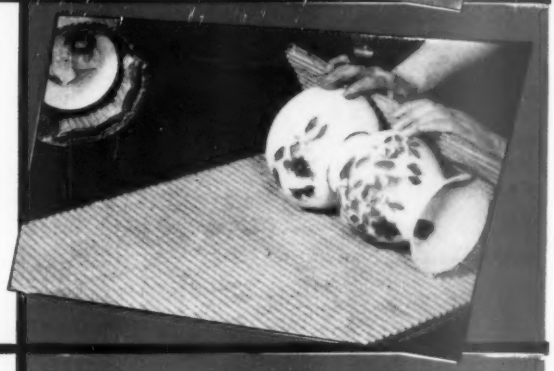
Use the LUGGAGE BOX for Extra Sales Appeal

Promotion of seasonal merchandise is but one of many successful applications of the H & D luggage box. Use it to add extra value to your product, to win extra sales appeal. It makes your product easier to carry, easier to use. Your dealers will endorse it—because it displays well, simplifies the selling job, reduces selling costs, eliminates repacking and wrapping.

PLYPAK*-- *A Packaging Material of a Thousand Uses*

PLYPAK* is a corrugated packing material that combines several thicknesses of corrugated paper to form a protective "blanket" which is ideal for packaging fragile merchandise. Clean and easy to handle, PLYPAK* is simply "wrapped" around a product, gives it a soft, close-fitting cushion that defies shock. Ask for sample.

*REG. U. S. PAT. OFF.



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$HORT CUT$

BY CHIEF BLACKHAWK

Use Porto-Power® to Zip Up Maintenance Crews!

Portable Hydraulic Equipment Replaces Time-Consuming And Back-Breaking Methods

IT'S NEWS when the maintenance crew *saves 12 man hours moving a* single machine! But it's even bigger news when such dramatic savings *continue*—on "1001" other tough jobs!

How It's Done

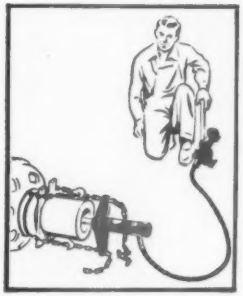
The secret lies in using Porto-Power in place of brute man power. Porto-Power, a patented type of hydraulic jack and auxiliary equipment, pushes, pulls, presses, clamps, spreads, bends with 2, 4, 7, 10, 20 and up to 50 tons of power.

Porto-Power can be hand-operated or electrically driven. Its many work-saving attachments speed up an amazing array of maintenance, manufacturing and construction jobs. Porto-Power frequently pays for itself in a single application or in less than 30 days.

Seeing Means Believing

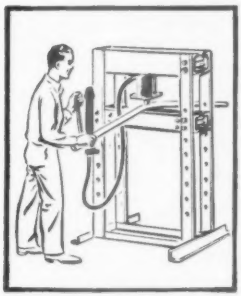
Porto-Power has become standard, accepted equipment for maintenance crews throughout industry. Maintenance superintendents insist on its use, wherever possible.

Ask your Industrial Supply Distributor for a demonstration or write for literature so you, too, can enjoy these savings.

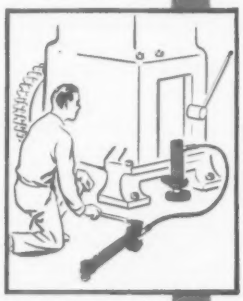


Pull gears, wheels and pulleys smoothly, safely, quickly and without damage. Porto-Power is faster than mechanical devices—safer than sledge-hammering methods.

A Jack for any span —any angle. Porto-Power is all-directional. Extensions, couplings, and base plate build the remotely-controlled hydraulic ram up for work at any height



Home-made Presses are big money-savers because of Porto-Power. Blackhawk furnishes blueprints showing how to build presses and mount Porto-Power.



Toe-Lift set-ups raise loads from low-levels. This is but one of many ways the ram can be adapted with simple, threaded Porto-Power attachments.

PORTO-POWER® — A Product of

BLACKHAWK MFG. COMPANY, Dept. P2789, Milwaukee 1, Wisconsin

BLACKHAWK®

HYDRAULIC EQUIPMENT • WRENCHES

Notice how light floods this textile plant in Shelby, N. C. Even with the camera pointed into the light, there's no evidence of glare.

FILTERED DAYLIGHT

through

BLUE RIDGE FROSTED AKLO GLASS

Reduces Glare. Bring in plenty of daylight for good seeing without worry about glare. Frosted *Aklo** Glass "softens" daylight, diminishes direct and reflected glare. That means less eyestrain, less eye fatigue and better quality workmanship. Employes like the eye-comfort of this cool, blue-green glass—much like sun glasses. No need to paint glass or hang shades.

Retards Sun Heat. *Aklo* absorbs most of the infra-red radiation of the sun—reradiates much of it back outdoors. Result? Cooler interiors—more comfort for workers—less load on air conditioning equipment.

Aklo Glass is manufactured by the Blue Ridge Glass Corporation of Kingsport, Tennessee, and sold through Libbey·Owens·Ford Glass distributors. To see for yourself how Frosted *Aklo* Glass reduces glare and sun heat, ask your distributor for a Radiometer demonstration.

Free Book on Reduction of Sun Glare and Heat. Write to Blue Ridge Sales Division, Libbey·Owens·Ford Glass Company, 9089 Nicholas Bldg., Toledo 3, O.

*R

BLUE RIDGE AKLO GLASS

Heat Absorbing • Glare Reducing • Figured and Wire Glass

Are you checking for lower costs?

17 BAKER TRUCKS

cost one customer only $17.16 per year for REPAIR PARTS and INSTALLATION LABOR

One of the largest users of battery-powered industrial trucks in the country has 17 BAKER TRUCKS of various types in service at one of its midwest plants. The plant keeps an accurate accounting of maintenance costs, and recently gave us these figures:

DATES OF PURCHASE

3 Trucks in 1941	4 Trucks in 1943
2 Trucks in 1942	7 Trucks in 1946
1 Truck in 1947	

Total months of service for all 17 trucks—954. Average age of trucks—4⅔ years.

Total Cost of all repair parts plus labor installation cost—$1366. (Exclusive of battery charging, tires and lubrication)

Cost per month for 17 trucks	$ 1.43
Cost per year for 17 trucks	17.16
Cost per year per truck	1.01
Cost per month per truck	8.4¢

Types of Truck—9 Fork Trucks, 1 Crane, 7 Platform Trucks.

This is obviously not a typical case. However, it does show what can be done, under ideal conditions, if the three fundamentals of truck operation are observed:

1. **Proper selection of trucks**
2. **Proper use of trucks**
3. **Proper preventive maintenance**

This plant follows all three religiously. Extreme care is exercised in selecting the make of truck and proper types for specific functions. Operators are schooled in proper handling of trucks—overloading is avoided wherever possible, proper floor conditions are provided and carelessness is not tolerated. Preventive maintenance—proper lubrication, battery charging, periodic checking of all vital points, etc.—is the responsibility of a separate department, established solely for this purpose.

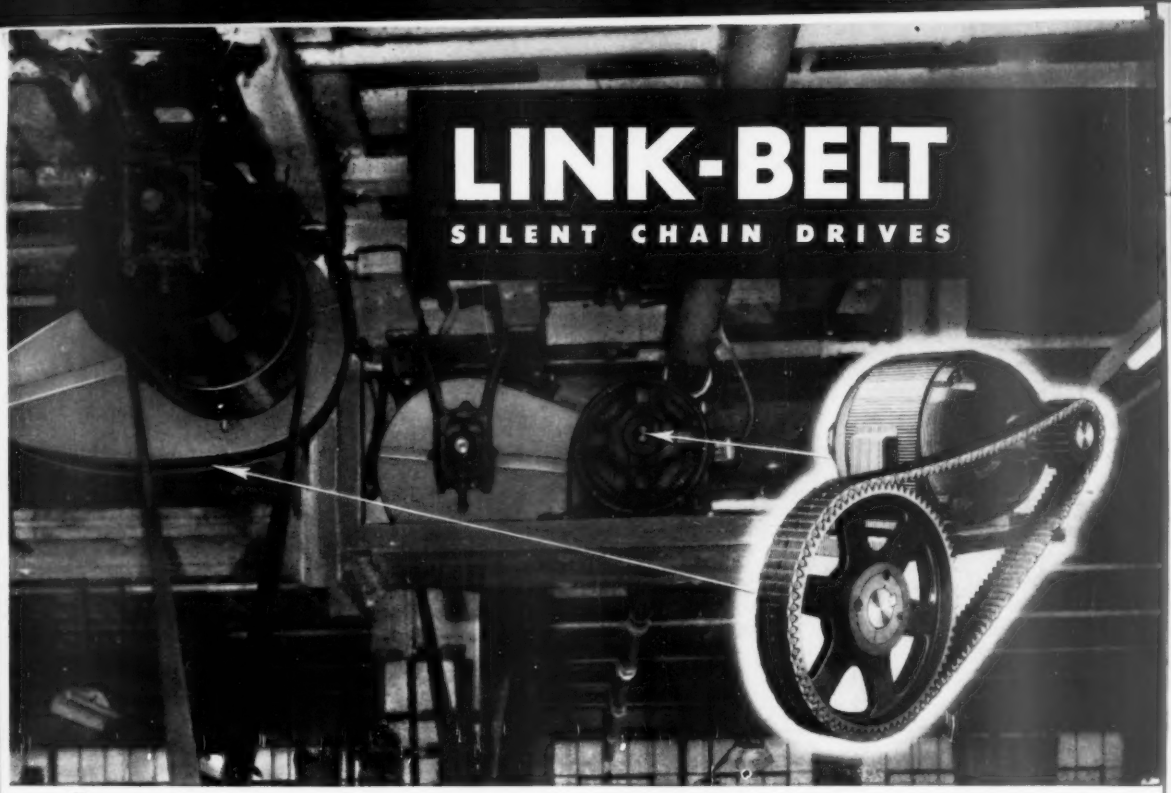
The BIG saving in this operation is the *continuous service* these trucks are giving—with practically no "down-time" for repairs.

Let a Baker Material Handling Engineer show you how you can keep your truck repair costs to a minimum—regardless of the makes of trucks you operate—or how with BAKER TRUCKS you can achieve results comparable to those above. Specific information on selection, proper care and operation of trucks is available on written request.

BAKER INDUSTRIAL TRUCK DIVISION *of The Baker-Raulang Company*
1218 WEST 80TH STREET • CLEVELAND 2, OHIO
In Canada: Railway and Power Engineering Corporation, Ltd.

Baker INDUSTRIAL TRUCKS

LOW-LIFT · HY-LIFT · FORK & RAM · CRANE · TRACTOR · PLATFORM



Increase Yarn Production

Operating on short centers without slip they drive spinning mules at rated speed

Above are seen two of the five Link-Belt Silent Chain drives recently installed at Roxbury Carpet Company's mill at Saxonville, Mass. These drives operate 320 spindle spinning mules, through line shafts and replace another type of drive which, because of the short centers, permitted a waste of power and speed through unavoidable slip. By maintaining full rated speed, the Link-Belt Silent Chain drives assure that the spinning mules will operate at their rated capacity. Link-Belt Silent Chain drives operate efficiently on short centers, run slack thus avoiding high bearing pressures and require no attention other than occasional lubrication.

LINK-BELT COMPANY 11,502

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Houston 3, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices, Factory Branch Stores and Distributors in Principal Cities.

LINK-BELT

THE SYMBOL OF QUALITY — LB — LINK-BELT

Power Transmission Machinery
"THE COMPLETE LINE"

LINK-BELT Industrial Standard Silent Chain Drives

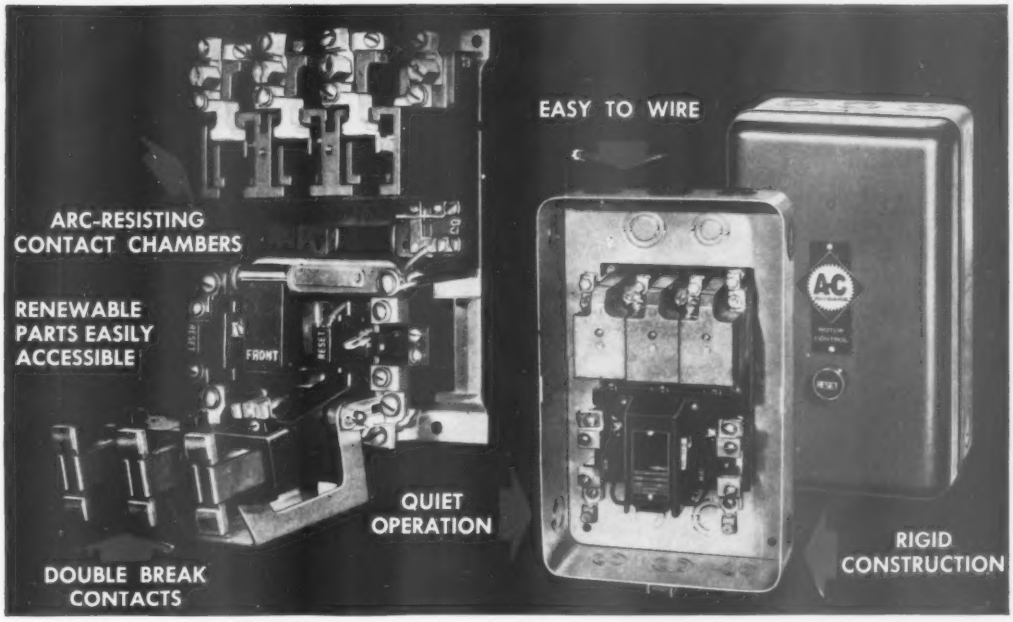
offer four new features combined with the well-known advantages of silent chain:

1. Interchangeability: They will operate on sprockets cut to the new Industrial Standard tooth form; likewise Link-Belt standard silent chain sprockets will fit the new Industrial Standard silent chain.

2. Taper-Lock Bushings: Made of gray iron with high steel content. Easy assembly and tight fit. No reboring necessary. Easy removal too!

3. All Steel Pinions, Hardened Teeth: Finished bores and key-ways for standard NEMA motor shaft sizes.

4. Easy Selection: The "Pre-selected" drives listed in Book 2125-A can be delivered from stock immediately by your nearest Distributor or Factory Branch Store. For easy-to-use selection tables, on ½ to 50 h.p. stock drives, ask for Book 2125-A.



Get *All* these Features

IN ALLIS-CHALMERS SIZE 0-3 LINE STARTERS

FOR UNFAILING START-STOP SERVICE . . . for easy installation and simple maintenance . . . you can specify an Allis-Chalmers motor starter *with confidence*. For *quality* construction goes into every A-C motor starter regardless of size! Quality features in NEMA 0-3 line starters include:

1. EASY TO WIRE — Terminals are clearly marked, accessible in roomy enclosures.

2. ACCESSIBLE — Contact assemblies can be removed or swung forward by removing only two screws. Movable contacts are held in clips by springs; stationary contacts are held by a single screw. Modified *E* magnet coils are easily removable. All renewable parts can be readily inspected or replaced.

3. DOUBLE BREAK CONTACTS add to interrupting capacity. *Silver* to *silver* surfaces give long life, low contact resistance — assure against corrosion and require *no dressing*.

4. ENCLOSED ARC CHAMBERS confine arcing. Sizes 2 and 3 contactors have magnetic yokes which act as blowouts.

5. QUIET OPERATION — Shading coils eliminate alternating current hum.

6. RIGID CONSTRUCTION — Steel base supports magnet and contact assembly for proper alignment of floating armature.

Get delivery on these starters off-the-shelf through your nearby Allis-Chalmers Authorized Dealer.

FOR LARGER MOTORS . . . sizes 4, 5, 6, and 7 Across-the-Line, and special purpose starters are available.

For reduced voltage starting, you can select from Auto-Transformer, Resistor or Reactor types.

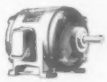
For *any* motor . . . *Squirrel Cage*, *Wound Rotor* or *Synchronous*, Allis-Chalmers offers you a wide selection of controls.

A-2753

Texrope is an Allis-Chalmers trademark.

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.



MOTORS — ½ to 25,000 hp and up. All types.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

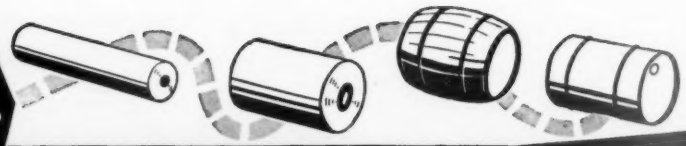
PUMPS — Integral motor and coupled types. Sizes and ratings to 2500 GPM.

ALLIS-CHALMERS, 1078A SO. 70 ST.
MILWAUKEE, WIS.

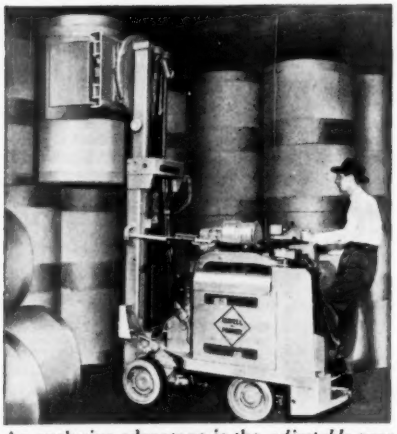
ALLIS-CHALMERS

"You can control any motor with an Allis-Chalmers motor starter."

if it rolls...



Grip it with this NEW ELWELL-PARKER Handling Device



An exclusive advantage is the *adjustable* pressure control and ability to grip a roll short of the center line.

Giants' hands couldn't be more dexterous or sturdy than this new attachment now available on Elwell-Parker Trucks. It's ideal for unloading or storing paper rolls and other materials in roll form including casks, barrels, drums, etc.

This roll handler is smaller, giving the driver greater visibility; lighter, adding to truck's load capacity; and it holds a roll in a *positive* grip—so important in speeding action *safely*. Surfaces that contact the roll are rubber padded to protect the load.

NO PALLETS NEEDED. One user has saved 20% in storage space by eliminating pallets. Close, orderly stacking either vertically or horizontally, and quick pick-up from stacks are accomplished with the attachment. The Elwell-Parker Electric Company, 4323 St. Clair Avenue, Cleveland 3, Ohio.

SEND FOR DATA
mentioning type and size of roll you handle.

ELWELL-PARKER
POWER INDUSTRIAL TRUCKS
Established 1893

"Boss-man really gave me Something to Sell

...when he built-in this **Veeder-Root Counter!"**

Want to build up the morale of your sales force? *Then build a Veeder-Root Counter into your product.* You'll give them something new to sell . . . an added usefulness to your customers . . . a distinctive feature that will set your product apart from your competitors.

Veeder-Root Counters are built, as integral parts, into all types of products from airplanes to machine tools to X-ray tubes . . . to supply facts-in-figures on use, production or performance . . . in any terms or units desired . . . mechanically or electrically. Let a Veeder-Root engineer explore the "uncounted opportunities" for new profit in *your* product. Write to

VEEDER ROOT INCORPORATED, HARTFORD 2, CONN.

In Canada: Veeder-Root of Canada, Ltd., 955 St. James Street, Montreal 3
In Great Britain: Veeder-Root Ltd., Kilspindie Rd., Dundee, Scotland

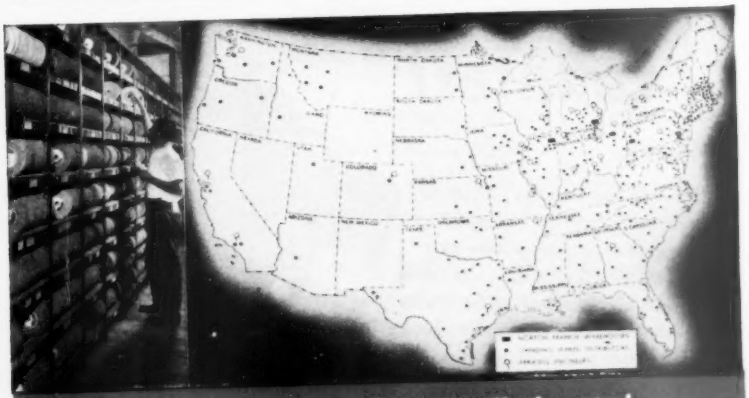
NEW VEEDER-ROOT 1260 COUNTER

Tops in accuracy and appearance is this compact, streamlined counter in rich 2-tone gray. It can be readily built into a wide range of products to operate as revolution or ratchet counter. . . . 4½" long, 1 9/16" high, 1¼" wide. Counts to million, then resets by turning knob. *Write for 8-page booklet on Standard V-R Counters.*

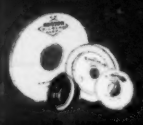
Veeder-Root COUNTERS

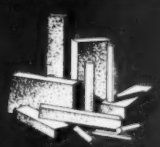
Now Is the Time to Cut

Skillful Engineering *backed by* Progressive Research



Adequate Stocks •• Strategically Located





Grinding Wheel Costs . . .

Norton Product "Know-How" and Application "Know-How" Can Do It for You

Now, more than ever, it is absolutely essential to get grinding, polishing and other abrasive costs down to rock bottom—down below that dangerously high "break-even" point. *And Norton "know-how" can help you do it.*

Skillful Engineering Backed by Progressive Research

Norton abrasive engineers are highly trained men—experts who can come right into your plant and specify a cost-cutting grinding wheel or abrasive for each of your jobs. Back of them are the engineers from the Worcester plant, each a specialist on a particular type of grinding or use of abrasives. And supplementing these Norton engineers there are more than 2000 distributor men the country over—a large percentage of them factory-trained by Norton.

To make sure that Norton engineers have available the very best grinding wheels and other abrasive products to solve your problems, a staff of 135 scientists and technicians is constantly at work in the Norton Research Laboratories. It is the efforts of these men which have brought forth the many important Norton developments such as 32 ALUNDUM abrasive—the sensational, single crystal abrasive which is cutting grinding costs in thousands of plants.

Adequate Stocks—Strategically Located

When the correct wheels for your jobs have been determined, they are handy to you—on the shelves of Norton distributors in over 225 cities of the United States. And these local stocks are carefully selected to meet the particular needs of each individual area. Back of these distributor stocks are the Norton branch warehouses in five important industrial centers and supporting them are the gigantic stock rooms at the mile-long Worcester plant.

Take advantage of Norton "know-how" to cut your abrasive costs. Call in your Norton abrasive engineer or your local Norton distributor—you will find him listed under "grinding wheels" in your classified telephone directory.

NORTON COMPANY, WORCESTER 6, MASS.

(Behr-Manning, Troy, New York, is a Division of Norton Company)

W-1245

NORTON ABRASIVES

THE GOOD RIGHT HAND OF INDUSTRY

STOCK SIZES WORTHINGTON HEAVY DUTY "QD" SHEAVES WITH MAXIMUM BORES INDICATED

A-SECTION SHEAVES

PITCH DIA	GROOVES 1	2	3	4
3.0				
3.2				
3.4				
3.6				
3.8				
4.0				
4.2				
4.4				
4.6				
4.8				
5.0				
5.2				
5.4				
5.6				
5.8				
6.0				
6.2				
6.4				
6.6				
6.8				
7.0				
7.4				
8.2				
9.0				
10.6				
12.0				
15.0				
18.0				
22.0				

B-SECTION SHEAVES

PITCH DIA	GROOVES 1	2	3	4	5	6	7	8	9	10
4.0										
4.2										
4.4										
4.6										
4.8										
5.0										
5.2										
5.4										
5.6										
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11.0										
12.4										
13.6										
15.4										
16.0										
18.4										
20.0										
25.0										
30.0	N.S.									
36.0										

C-SECTION SHEAVES

PITCH DIA	GROOVES 1	2	3	4	5	6	7	8	9	10	12
7.0											
7.5											
8.0											
8.5											
9.0											
9.2											
9.4											
9.6											
9.8											
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36.0											
44.0											
50.0											

D-SECTION SHEAVES

PITCH DIA	GROOVES 3	4	5	6	7	8	9	10	11	12	14	16	18	20
12.0													N.S.	N.S.
13.0														
13.5													N.S.	N.S.
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64.0														

Worthington QD Sheave—Original Tapered Cone-Grip Sheave. Easy to Get On—Easy to Get Off—Yet Always Tight on the Shaft. The Quality-Built Sheave That Makes Alignment Easy—for Longer Belt Life.

N.S. DENOTES NON-STOCK SIZE

$2,500,000 INVESTED IN STOCK

to deliver your sheave immediately

As long as it takes our distributor's shipment to get there is as long as it takes—in most cases—to get exactly the sheave you need into your hands. Your Worthington distributor has practically any stock size you'd ever call for—if he hasn't, one of the Worthington warehouses will get it to him in 24 hours or less.

Check your sheave requirements. With more sheaves listed as "stock sizes" and more sizes in stock than any other distributor, your Worthington distributor may be able to save you the cost of a special sheave.

Top-ranking distributors in every industrial center handle Worthington QD Sheaves and Worthington-Goodyear V-belts. They are backed by Worthington warehouses whose stocks duplicate the factory stock at Buffalo—more sizes stocked than any other sheave on the market. With 853 sizes in "A", "B", "C" and "D" sections, ½ to 600 hp, you can fill almost any rpm requirement with a *stock* sheave. Also: 332 listed stock sizes of EC Cord V-belts.

So, when you need sheaves, call your local Worthington Multi-V-Drive distributor—his name is under Worthington in A-Z Section of THOMAS' REGISTER.

For Balanced Drive Performance

Specify Worthington Multi-V-Drives, with QD Sheaves and Worthington-Goodyear EC Cord V-belts. (Goodyear EC Cord or Steel Cable V-belts are used exclusively in Worthington Multi-V Drives.)

WORTHINGTON

WORTHINGTON PUMP AND MACHINERY CORPORATION

MULTI-V-DRIVE SALES DIVISION

Buffalo, New York—General Offices: Harrison, New Jersey

The Good Right Hand of Industry

POWER TRANSMISSION: sheaves, V-belts, variable speed drives

PUMPS: centrifugal, power, rotary, steam

AIR COMPRESSORS: water-cooled, air-cooled

MVD-92

How to Give Your Boss Relief from "COST-ITIS" Headaches and Get Yourself a Raise!

How about doing your boss a favor, and a good turn for yourself, at the same time? We mean a *money-saving* favor for your boss, and a money-*making*, *salary-raising* boost for you.

Your boss needs the answers to a lot of 64 dollar questions right now. Answers, like what to do about profits being squeezed, prices under pressure, sales declining, costs already cut to the bone, but *still too high.*

And the biggest headaches of *all*, are his *"COST-ITIS" HEADACHES!* Give him relief from that dizzy problem, and he will know how to lick the others.

But often your boss can't see the forest for the trees. So we're tipping you off to a cost-cutting way he *ought* to know about, but often *doesn't*, because somebody in the plant took him too literally, when he said: "No more capital expenditures."

That way, is the material handling Automatic Electric Truck way that can *cut your material and product handling costs* AS MUCH AS HALF!

If you're using antiquated, manual handling methods of *lifting* and *moving* your products, it's a cinch that amazing, low original cost Automatic Electric Trucks are just what you and your boys need to lighten your work and go home at night practically daisy fresh.

And for the boss, it's the" COST-ITIS" *headache relief* he will happily pay off on, and the *payee* might as well be *you!*

So mail the coupon, and get all the money-saving facts about these famous industry-tested electric trucks. Find out how, with effortless, easy finger-tip-control, they lift, move and stack hundreds of pounds or tons and tons so easily, a stenographer could operate them in a breeze.

Yes, these mighty giants of electric power *do all the work.* One man accomplishes as much as three men doing fatiguing *manual* handling. The other two can be moved to more productive, *better paying* jobs.

That's *cost cutting* that pays off for *everybody!*

So, before the boss says: *"There must be something wrong here, boys,"* give him the Automatic Electric Truck money-saving story. When you show him literally thousands of dollars he can save *without* cutting wages, and *without* layoffs, he will take back that order: "Lay low on capital expenditures."

Because, as *you* and *he* can see, cutting material handling costs with Automatic Electric Trucks is not a capital expenditure, but a money-maker for *everybody* . . . management, white collar workers, and labor.

So again we say: mail the coupon, read up on the fascinating facts we give you, and then trot upstairs and really show the boss *something!* He will listen, he will be amazed, he will buy.

And start planning now, *all the extras* that *RAISE* will bring you and your family!

Automatic ELECTRIC TRUCKS — Lighten LIFE'S LOADS

Transporter — A PRODUCT OF AUTOMATIC — Lightens LIFE'S LOADS

Trade **Automatic** Mark

39 W. 87th St., Dept. M-9, Chicago 20, Ill.

Please send me complete money-saving facts on amazing Automatic Electric Trucks without obligation.

Company Name.....

By.....*Position*.....

Street Address.....

City.....*Zone*....*State*.....

"Me . . . stock all those endless V-Belt sizes?"

"Not since I use VEELOS"

"I can replace any V-belt in our plant with just these reels of Veelos."

That's a typical Veelos user telling you how Veelos cuts V-belt inventory. If you use O, A, B and C widths, four reels of Veelos give you a choice of more than 316 sizes. Use only A and B? Then two reels are all you need.

Buying matched sets of endless V-belts is costly. Forget it with Veelos. Forget, too, belt deterioration and obsolescence. Veelos on reels saves storage space . . . simplifies stock records.

Veelos is quickly and easily installed. On drives with fixed centers or outboard bearings, Veelos is installed without moving the motor or dismantling the machine. It provides substantial savings in installation and maintenance costs.

VEELOS
THE LINK
V-BELT

SEND FOR FREE VEELOS CATALOG. It shows how you can benefit from the many important advantages of Veelos. Fully illustrated. Complete engineering data. Write for it.

MANHEIM MANUFACTURING & BELTING COMPANY
MANHEIM, PA.

ADJUSTABLE TO ANY LENGTH • ADAPTABLE TO ANY DRIVE

Made in all standard sizes, fits all standard grooves. Packaged on reels in 100-foot lengths. Sales engineers in principal cities; over 300 distributors throughout the country. Veelos is known as VEELINK outside the United States.

Use of *Energy in Color* Improves Production of Bottle Caps, Seals and Filling Machinery, Says Crown Cork & Seal Company's Chief Engineer

THESE DAYS . . . the alert manufacturer considers carefully every development—no matter how new or unusual—which will help him to build more and better goods at lower cost.

COLOR DYNAMICS is winning increasing approval among industrial executives in many fields because it has proved that its use improves both efficiency and well-being of workers.

Characteristic of the comments on this new painting method is the following letter from R. B. Hoffmeister, Chief Industrial Engineer of The Crown Cork & Seal Company of Baltimore, Maryland. This organization is one of the largest producers in the world of bottle crowns for beverages, metal milk bottle caps, closures for food, cosmetics and pharmaceuticals, and the equipment for filling these containers.

"We recently constructed a new one-story daylight building to house our Machinery Division," writes Mr. Hoffmeister.

"In this plant we have gone one hundred per cent for COLOR DYNAMICS. This color scheme has not only been applied to the machine section but has also been carried out in offices, engineering department, cafeteria, locker and wash rooms.

"No more drab gray or dark blue machines, no more glaring white walls—only restful colors. The workmen are proud of their surroundings and take great pains to keep their equipment and surroundings clean. We have also noted decided betterment in the quality and quantity of production, in morale and in safety. We are completely convinced that color has found its place in industry."

Why not test the value of Pittsburgh COLOR DYNAMICS in your plant? Try it on a machine or two. Better still, try it in one department. See the difference it makes in the efficiency, morale and safety of your employees. We'll be glad to make a COLOR DYNAMICS survey of your property on request without obligation on your part.

Paint RIGHT with Color Dynamics
Paint BEST with Pittsburgh Paint!

The benefits of COLOR DYNAMICS are made more enduring when you use Pittsburgh's long-lasting high-quality paints for every need.

WALLHIDE—available in four types: **FLAT**—a velvet-like finish that is beautiful and restful; **SEMI-GLOSS**—with higher sheen; **GLOSS**—with enamel-like sheen; **PBX**—extra-durable finish can be washed frequently.

LAVAX PBX ENAMEL—for woodwork, furniture or metal trim. Brushes out freely and easily to a smooth, satin finish.

FLORHIDE—for floor surfaces. Quick-drying, tough, can be scrubbed with soap solutions.

LAVAX MACHINERY ENAMEL—a durable finish impervious to grease, grime or dirt.

SEND FOR A COPY OF THIS BOOK!

● Our booklet—"COLOR DYNAMICS IN INDUSTRY"—explains this new painting system and how you can use it in your plant. Mail this coupon for your FREE copy.

Pittsburgh Plate Glass Co., Paint Div., Department PM-69, Pittsburgh 22, Pa.

Name_____

Street_____

City_____ State_____

PITTSBURGH PAINTS

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY

FOR BETTER INDUSTRIAL LIGHTING LOOK FOR THE "HIDDEN PLUS"

You can't see the ballast in an assembled fluorescent lighting fixture—yet the quality of the ballast largely determines the quality of the fixture.

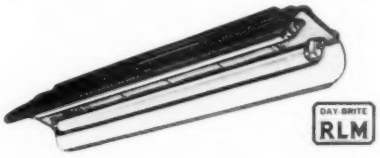
A Certified ballast is the "hidden plus" which assures full lamp life, quiet operation, rated light output and dependable performance for the life of the fixture. In short, a fixture with a Certified ballast will do its job *well* over a *long period* of time.

But how can you identify a top quality ballast? Easy! Just look for the Certified E. T. L. shield right on the ballast.

CERTIFIED E.T.L. SPEC. NO. 6 HIGH PF

This shield can be placed *only* on those ballasts which have met strict specifications and have been checked and tested by Electrical Testing Laboratories, Inc., an *impartial* judge.

The easiest way to turn out an "economy" fixture is to install a cheaper ballast—a part you don't normally see. But "cheap" fixtures *can't* deliver dependable, efficient lighting. Demand the "hidden plus"—the Certified E.T.L. shield on the ballast —and get *better* lighting.



DAY-BRITE'S NEW "TUR-A-TOP" FIXTURES HAVE THE "HIDDEN PLUS"... AND MORE!

You'll find the ballasts in "Tur-A-Top" fixtures are Certified E.T.L. ballasts. And you'll find many other points of superiority, such as:

- ✔ **ONE-PIECE TOP,** stamped out of deep drawing steel—strong and attractive in appearance.
- ✔ **TWO COATS OF PORCELAIN** for extra resistance to chipping, acid and alkali.
- ✔ **RIGID LAMP HOLDERS** fastened to the stamped top for *extra* strength.
- ✔ **NO-BLINK LAMP STARTERS** are easily accessible without disturbing the lamps.
- ✔ **BEADED REFLECTORS** to assure that "Tur-A-Top" reflectors can never become bowed or wavy.
- ✔ **WING NUTS** have extra large 2-inch diameter to prevent chipping, assure positive mounting of reflector to channel. Off and on in one minute —no tools required.

Like all machinery, an industrial lighting fixture is best judged on the basis of *high quality* . . . to assure low maintenance and replacement cost. Start *right* . . . with Day-Brite. Specify Day-Brite "Tur-A-Top" fixtures . . . and save money in the long run. Write today for Bulletin 30-B.

IT'S EASY TO SEE WHEN IT'S

DAY-BRITE *Lighting*

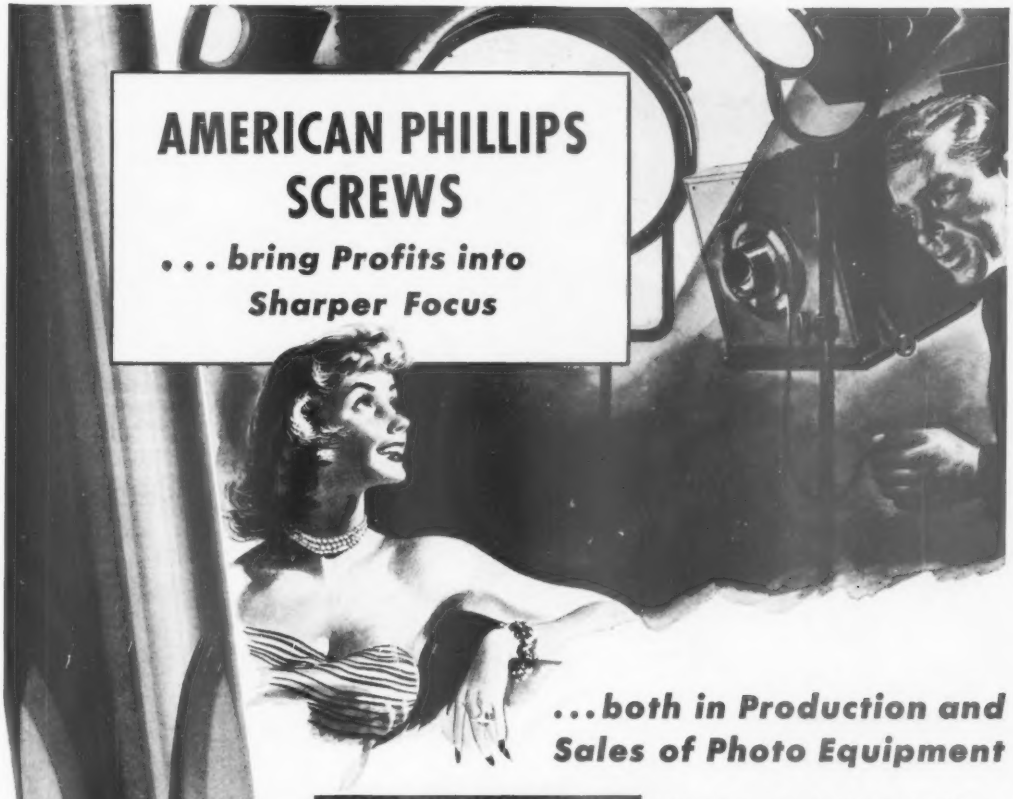
Day-Brite Lighting, Inc., 5441 Bulwer Avenue, St. Louis 7, Mo.
In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario

219

DISTRIBUTED NATIONALLY BY LEADING ELECTRICAL WHOLESALERS

AMERICAN PHILLIPS SCREWS

. . . bring Profits into Sharper Focus



. . . both in Production and Sales of Photo Equipment

SHARP FOCUS ON COST-CONTROL: Lights, cameras, and other tools of the glamorizing trade are liberally studded with that modern quality-mark — the universal crossed recess of American Phillips Screws. Makers of this costly photographic equipment can't afford rejects or refinishing . . . and they can't afford slow, old-fashioned assembly with slotted screws. They find . . . as so many cost-conscious manufacturers in *all* lines have found . . . *that American Phillips Screws always cost least to use.* For time-savings alone run as high as 50%!

SHARP FOCUS ON SALES: American Phillips Screws have built up a huge and faithful public who know that the universal crossed recess means *quality throughout* . . . and that the product is put together to stay. These assurances, added to their definite decorative value, make American Phillips Screws a feature to be *profitably promoted* in any selling effort. Care to have us show *you* how? Just write:

AMERICAN SCREW COMPANY, PROVIDENCE 1, RHODE ISLAND

Chicago 11: 589 E. Illinois St. *Detroit 2:* 502 Stephenson Building

4-WINGED DRIVER CAN'T SLIP OUT OF PHILLIPS TAPERED RECESS

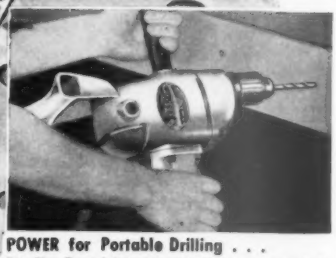
AMERICAN PHILLIPS *Screws*

ALL TYPES

ALL METALS: Steel, Brass, Bronze, Stainless Steel, Aluminum, Monel, Everdur (silicon bronze)

Wherever You Use This Powerful Drill

YOU'RE SURE OF SPEEDIER WORK AT LOWER COST!



POWER for Portable Drilling . . .

The Van Dorn ½" Standard Drill has correct spindle speed for driving twist drills up to ½" in steel and all other metals, using high-speed or carbon steel bits. Drives wood augers up to 1" in hardwood.

POWER for Drill Press Work . . .

Mounted in a Van Dorn Drill Stand with plenty of leverage for tough drilling. Smooth, positive feed helps on more precise work. One-hand operation makes it easier to guide work.

POWER for Hole Sawing . . .

The ½" *Standard* Drill drives Van Dorn Hole Saws for cutting clean, round holes up to 3½" in diameter, in any material a hacksaw will cut, a lot faster . . . as portable tool or drill press.

FOR POWER SPECIFY

SEND FOR OUR FREE CATALOG

It gives detailed information on over 100 Van Dorn Portable Electric Tools and over 1,000 accessories. Your nearby Van Dorn Distributor will be glad to give you all the facts on this Drill, help you on any tooling problem. Ask him today! The Van Dorn Electric Tool Co., 719 Joppa Road, Towson 4, Md.

"Van Dorn"

(DIV. OF BLACK & DECKER MFG. CO.)

PORTABLE ELECTRIC TOOLS

They Do It With People
—why not with Paints?

The Past-Performance Test

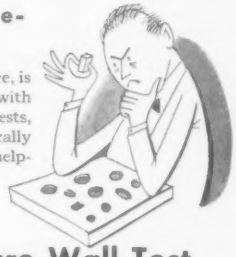
No one ever hires a person without applying the "Past-Performance" test. "What have you done?" . . . "What is your background . . . your education?" . . . "What are your qualifications?" . . . "Where have you worked before?" This, indeed, is good business.

The Say "Ah" Test

Some businessmen have found it wise to use a thorough physical check up to determine the health of prospective workers.

The Square-Peg-in-the-Round-Hole Test

Newer, and of growing significance, is the aptitude test. Not content with past-performance and health tests, businessmen find that scientifically planned aptitude tests are most helpful in finding the *right* man for the *right* job.



The Round-Can-on-the-Square-Wall Test

How many square feet of solid coverage can you get from a round can of paint?

Let's not guess. It is better to test.

Paints, like people, differ greatly. A gallon of one paint will cover more square feet than a gallon of another. Some paints go on faster and easier. Some look better and last longer. So test, brother, test.

Take a gallon of Barreled Sunlight, thin properly, and put it on a wall. See how much it covers . . . how *well* it covers. Check how fast it goes on. Notice how white and clean it looks after drying. *Then*, do the same with a gallon of any other good paint. Compare the results . . . in terms of coverage, appearance and painting time. You'll see how true it is that Barreled Sunlight will give you a better-looking, longer-lasting interior paint job *for less money* than any other paint.

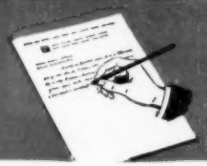
Let's talk it over. Write and our representative will call.

U. S. GUTTA PERCHA PAINT COMPANY
2-H Dudley St., Providence, R. I.

Barreled Sunlight *Paints*

In whitest white or clean, clear, pleasing colors, there's a Barreled Sunlight Paint for every job

Here's the booklet you've wanted
with the answers you've wanted on



write, on your company letterhead, for your free copy to
Aluminum Company of America, 1900H Gulf Bldg. Pittsburgh 19, Pa.

INSULATED WIRE AND CABLE OF

ALCOA EC ALUMINUM

LIGHT WEIGHT • LOW COST

ON THIS JOB TODAY

CHARTS, DIAGRAMS, ILLUSTRATIONS ANSWER QUESTIONS LIKE THESE:

What conduit sizes are required for wire and cable with Aluminum conductors?

Has Aluminum been proved in actual installations? For how long?

How does Aluminum handle?

What kind of terminations can I make with Aluminum?

These and many other basic questions about this lightweight, low-cost wire and cable, made with Alcoa E. C.* Aluminum, are answered in Alcoa's new booklet, "Alcoa E. C. Aluminum for Electric Wire and Cable". It's yours for the asking. Just write us, on your company letterhead, for your free copy. Be sure to pass this booklet on to others in your organization.

Alcoa makes light, strong, conductive E. C. Aluminum which leading wire manufacturers draw, strand and insulate, and sell under their own trademarks. It's available in required types of insulation to help you make installations faster and at lower cost.

ALUMINUM COMPANY OF AMERICA, 1900H Gulf Building, Pittsburgh 19, Pennsylvania.

*E. C.: *Electrical Conductor* Aluminum

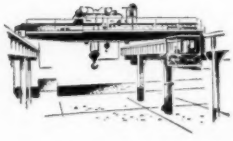
ALCOA EC ALUMINUM

FOR ELECTRIC WIRE AND CABLE

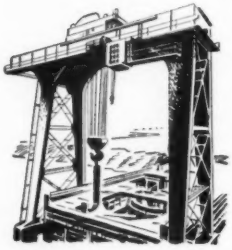
Giant gantry or handy hoist . . .

WORLD'S LARGEST CRANE, installed in Hunter's Point Navy Yard at San Francisco, Cal., is equipped exclusively with General Electric crane and hoist motors and controls.

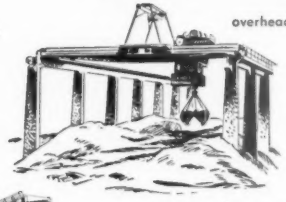
SMALL INEXPENSIVE HOISTS, now being made in ¼, ½ and 1-ton sizes, depend on electric motors and control for speed and efficiency.



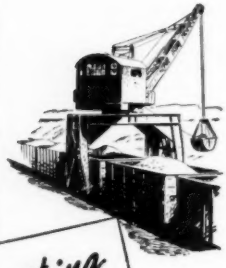
general-purpose crane



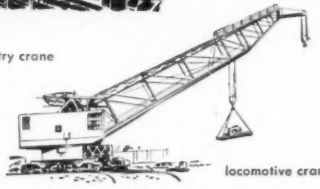
gantry crane



overhead bucket crane



portal crane

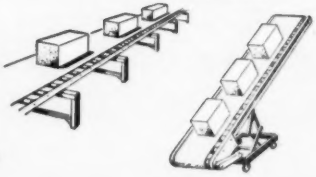


locomotive crane

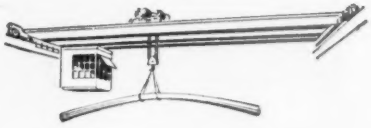
semi-gantry crane

Everything electrical for **MATERIALS HANDLING**

CONVEYOR DRIVES



CRANE DRIVES



POWERED by G.E.

TO HELP CUT YOUR MATERIALS HANDLING COSTS

As a manufacturer or a user of industrial cranes or hoists, you are concerned with the selection of the right drive for the equipment. General Electric may be able to help increase the performance of your unit, save you money, or both. While a detailed study by our engineers will be needed to show you how much and in what way, here are two facts worth remembering:

FACT #1—General Electric's experience covers the *entire field* of electric crane and hoist drives—from a 500-ton crane to 200-pound hoists.

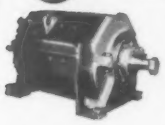
FACT #2—General Electric offers a *complete* line of electric equipment for cranes or hoists—to operate from a-c or d-c power systems.

For these reasons, General Electric is particularly well suited to work with you on electrification of any crane or hoist—or any piece of materials handling equipment. Find out for yourself now by calling in a representative from your nearest General Electric office. *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*

SEE this modern materials handling program

Ask your materials handling equipment supplier or G-E representative to show you "Materials Handling—In Receiving, Warehousing and Shipping"—General Electric's authoritative new movie covering in detail the latest techniques and equipment, without sales bias. When you see the movie, you will receive a copy of the 92-page technical manual which supplements the film. ***ASK TO SEE THIS PROGRAM NOW!***

D-C CRANE & HOIST DRIVES



Type MD 600 Motors for trolley, travel and hoist drive, are sturdy, dependable units, built for long life under tough conditions. Other d-c motor types are available to completely cover all crane applications.

NEW **D-C Two-Magnet Brake** provides fast, sure action, yet occupies little space; is simple and easy to maintain.

NEW **D-C Magnetic Control** with dynamic braking provides fast and accurate performance with maximum safety, for the toughest, most exacting duty. For every d-c crane, drum, master, and limit switches, protective panels and resistors are available as required.

A-C CRANE & HOIST DRIVES

Tri-Clad Type MR slip-ring motors are widely used for driving cranes and hoists from a-c power supply. Types KR and KG high-torque squirrel-cage motors are available where constant speeds are satisfactory.

A-C Controls. General Electric offers both magnetic and manual control, Thrustor brakes, resistors, master, drum, and limit switches. Max-speed and other adjustable-voltage controls available for special jobs.

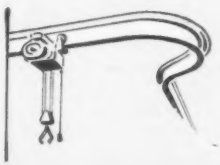
UNIT HOIST DRIVES

A complete line of a-c and d-c motors is available for mounting as an integral part of small industrial hoists.

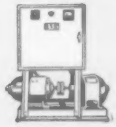
GENERAL ELECTRIC

668-71

HOIST DRIVES

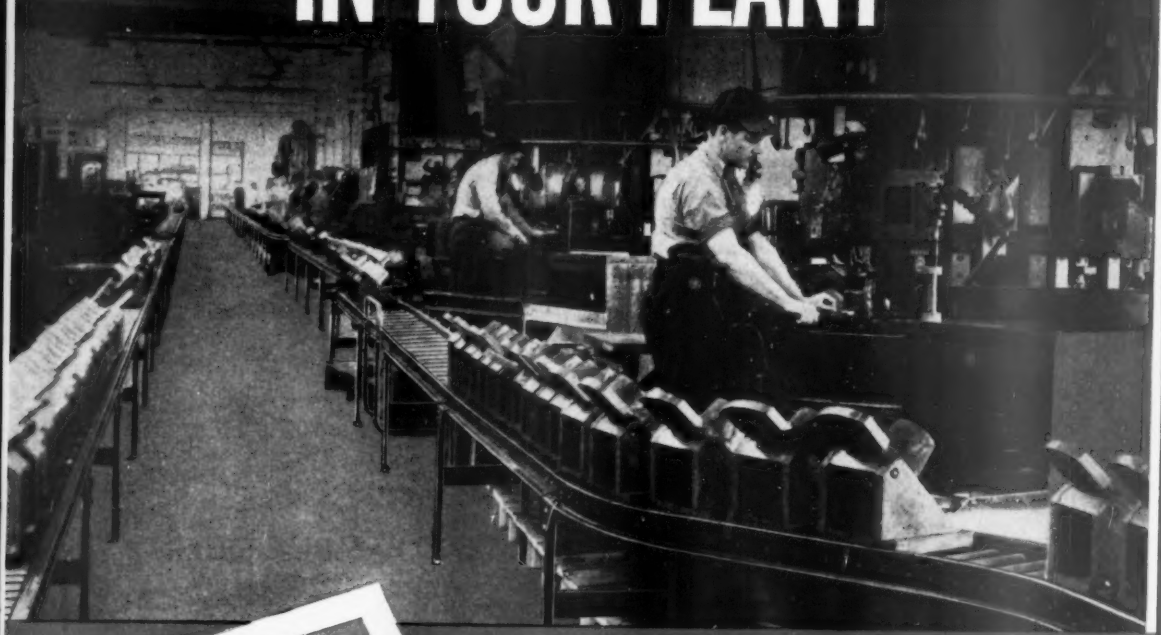


INDUSTRIAL TRUCK DRIVES & BATTERY CHARGERS



Better, Lower-Cost Handling

IN YOUR PLANT...



FACTORY MANAGEMENT AND MAINTENANCE Says: "Better Materials Handling Offers Industry its Biggest Opportunity to Cut Production Costs and to Increase Productivity."

HANDIBELT: Portable all-purpose, self-contained electric powered (110 V.—A.C.) reversible belt conveyor unit. Belt inclines or declines at adjustable heights. Handles all types cartons, cases, bags or boxes. Fits in crowded aisles, cars, trucks, elevators.

EXTENDOVEYOR: Unique, self-contained, portable, electric powered belt conveyor. Work it like an accordion—make it long or short—slope it up or down. Readily moves about in confined areas. Reversible. Maximum length 46 feet.

Standard

CAN AID YOU TO CUT COSTS - SPEED OPERATIONS ON PRODUCTION, ASSEMBLY, PROCESSING, PACKAGING LINES ... STORAGE AND WAREHOUSE AREAS . . . RECEIVING AND SHIPPING DEPARTMENTS . . .

To get results in cutting handling costs you need the best in modern conveyors and, equally important, engineering "know-how" to apply and install them most effectively in your plant.

Whatever you make, package, or handle —in large or small quantities—whatever your need in conveyors—a complete engineered system, a portable, self-contained conveyor unit, an 8 to 10 ft. section of light weight, easy-to-carry roller conveyor for "spot" use— call on Standard.

Standard is known as headquarters for conveyors—gravity and power, roller, belt, slat, pushbar—portable conveyor units—spiral chutes—pneumatic tube systems.

More than 40 years' experience qualifies Standard to recommend, design or build efficient equipment for any installation or need.

Write, telling us what you make or handle. We will send literature showing Standard Conveyors in use in your business Address Dept. FM-89.

STANDARD CONVEYOR COMPANY
General Offices: North St. Paul 9, Minnesota
Sales and Service in Principal Cities

HANDIPILER: Portable, electric powered (110 V. —A.C.) self-contained, light weight reversible belt conveyor unit. Use it for loading, unloading, elevating or stacking of all types of boxed, cartoned, bagged or case goods. Floats reaches far into cars, trucks, trailers, storage piles.

INCLINEBELT: Reversible belt powered unit for between-door handling of boxes, bags, cases or cartons. Ideal for multi-door warehousing or shipping and receiving areas. Two belt widths available—14 inch and 24 inch.

HANDI-DRIVE: New "pack aged" conversion unit to power any gravity belt or roller conveyor. Quickly and simply converts any existing belt or roller conveyor to power driven live belt or roller. Design your own system with Handi-Drive.

(Use this Coupon to Get Complete Information)

STANDARD CONVEYOR COMPANY Dept. FM-89, North St. Paul 9, Minn.

Send literature on equipment checked.

- ☐ Handibelt
- ☐ Levelbelt
- ☐ Handipiler
- ☐ Handi-Drive
- ☐ Extendoveyor
- ☐ Inclinebelt
- ☐ General Catalog—Gravity and Power Conveyors
- ☐ General Catalog—Standard, Portable and Power Units

Name and Title: .....

Company: .....

Street Address: .....

City: .....Zone .....State .....

AMERICAN BLOWER

GYROL *Fluid Drive*

7 questions about

Read these seven questions and answers. They tell you how the new American Blower Hydraulic Electric Power Units with built-in Gyrol Fluid Drive provide lower starting current, smoother acceleration, overload protection and shock absorption for your electrically driven machines.

1. What is a Hydraulic Electric Power Unit?

A Hydraulic Electric Power Unit is a complete packaged unit with dependable AC motor, built-in Gyrol Fluid Drive and housed in a frame built to standard NEMA mounting bolt hole dimensions. No on-the-job engineering is required, no expensive controls are necessary. Wiring is actually simplified.

2. What is Gyrol Fluid Drive?

Gyrol Fluid Drive is a highly flexible method of power transmission. When interposed between a motor and its load, power is transmitted solely by a cushion of oil. Since there is no mechanical connection between motor and driven machinery, shock is absorbed by the cushion of oil. Power transmission is smooth and flexible.

3. Is Gyrol Fluid Drive a proved principle?

Two typical Fluid Drive installations

Yes! Thousands of installations have already been made in public utilities, mills, automotive plants, etc. In fact, today there are more than 7,500,000 HP being driven through Gyrol Fluid Drive, exclusive of automotive drives.

4. What are the advantages to me?

With Gyrol Fluid Drive you always get a smooth start for your machines. The motor starts unloaded and reaches 85% of full speed before starting the load. This means savings of more than 50% in current expended in starting alone . . . the need for overmotoring is eliminated . . . both motor and machinery are protected against shock.

You get complete overload protection through positive gradual acceleration without any vibration or jerking. By using Hydraulic Electric Power Units on conveyors, centrifugals, mixers, winders, spinners and other machines, you add to machine life, improve performance and save on maintenance costs.

5. In what sizes are the new power units manufactured?

Hydraulic Electric Power Units are made in 9 sizes, powered by 1-1½-2-3-5-7½-10-15-20 HP electric motors.

For special engineering data on Gyrol Fluid Drives for all motors in excess of 20 HP, call the nearest American Blower Branch Office.

6. What about installations?

Installations of Hydraulic Electric Power Units are easy. All units are sold and shipped complete with motor, ready to install. Each unit is mounted on a frame built to standard NEMA mounting bolt hole dimensions. You simply bolt unit to machine and connect the wires.

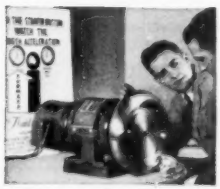
7. What about delivery?

Units powered with 5 and 7½ HP motors are available now. Other units, from 1 through 20 HP, will be ready for fall delivery.

For further data, ask your power transmission jobber or dealer, or phone the nearest American Blower Branch Office.

Demonstration shows remarkable advantages of Gyrol Fluid Drive

These tests show the advantages of Gyrol Fluid Drive Hydraulic Electric Power Units.



In a fraction of a second motor comes up to 85% of speed—saves 50% in starting current.

Torture? Reverse motor with flywheel running full speed forward, or brake flywheel.

No damage! Remove brake, and flywheel accelerates to full speed in seconds.

Hydraulic Electric Power Units

Hydraulic Electric Power Unit, Type TM (Powered With Constant Speed AC Motor)

THE IDEAL DRIVE . . .

for all machines designed where low starting current, smooth acceleration, overload protection and shock absorption are highly desirable characteristics.

AMERICAN BLOWER

GYROL *Fluid Drive*

Serving home and industry

AMERICAN STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILER • ROSS HEATER • TONAWANDA IRON

A note on Abrasives

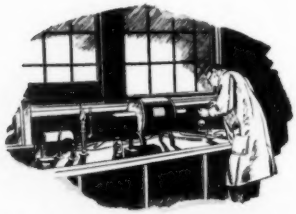
The Advantages you get from "Advanced" Technical Research

During the war, a shortage of bonding material, used in making grinding wheels, developed. This situation could have presented a serious problem... except for the fact that it had been anticipated. A substitute had been largely developed in advance by our researchers and now was rushed into service. Not only did it fill the immediate need...it proved superior and continues in current use.

In developing and producing better abrasives, science and production agreed the answer might be found in a study of the development of silicon carbide and aluminum oxide crystals in a furnace where operating temperatures exceeded 2000°C. Not only did researchers of The Carborundum Company develop a high-temperature microscope for this work—they hooked it up with a camera to photograph the reaction in color.

These two, out of a hundred and one research activities underway at The Carborundum Company, help explain why the right abrasive products by CARBORUNDUM are ready whenever new high-temperature alloys or other new materials are developed, or new industrial techniques put into operatio

From these laboratories have come wheels that precision grind thousands of parts with unvarying accuracy...belts and discs that cut faster and cooler, grains that generate high finishes in a hurry. It is an extra assurance of continual improvement in grinding, sanding and finishing with abrasives by CARBORUNDUM. The Carborundum Company, Niagara Falls, New York.



The only complete line of Abrasive Tools is

CARBORUNDUM

TRADE MARK

"Carborunaum" and "Aloxite" are registered trademarks which indicate manufacture by The Carborundum Company

Engineering News
ON ABRASIVE PRODUCTS

ALOXITE TPT POLISHING GRAIN

TPT is a new aluminum oxide abrasive grain specially developed for polishing operations which require removal of comparatively large amounts of metal. Especially suited for severe polishing operations, it cuts fast and is highly efficient. In actual comparative tests, this tough, sharp, long lasting abrasive gives as much as 100% greater production per wheel set up. It is also ideally suited to the entire field of grain polishing applications and can be applied successfully and economically within its available grit range, sizes 16 to 60.

TPT POLISHING GRAIN OFFERS THESE IMPROVED QUALITIES:

TOUGHNESS—Special processing assures resistance to fracture, on severe operations. Polishing wheels headed with TPT grain last longer and require heading less frequently.

UNIFORMITY—All working grain, solid, well-shaped, sharp and angular—free from useless flats, splinters and weak particles.

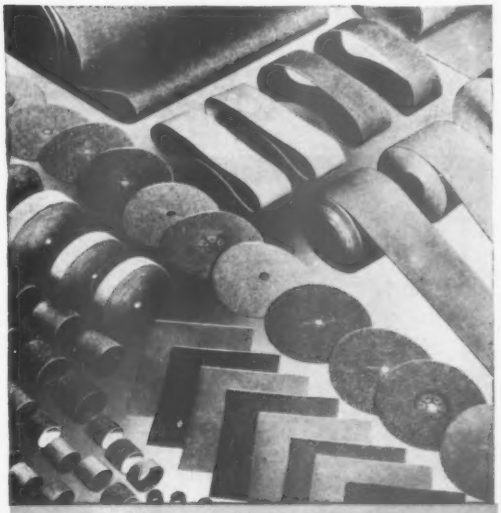
FASTER CUTTING—Sharp particles retain sharpness and angularity for longer periods... provide higher production rates and more economical operation.

IMPROVED EFFICIENCY—Each set-up lasts longer, produces more pieces per hour, and cuts abrasive and polishing costs. Longer lasting polishing wheel set-ups reduce number of expensive re-headings.

THE VONNEGUT BRUSH-BACKED SANDER HEAD

Designed for use on irregular surfaces, this sander head finishes, in seconds, jobs that usually take minutes longer by costly hand sanding or other less efficient methods. Shredded abrasive tips contact every groove and depression of contours, curves, carved and moulded surfaces... produce an excellent uniform finish which may be buffed easily as desired. It is particularly effective in blending surface irregularities and eliminating scratches, mold flash and burrs of moderate severity.

While the use of the Vonnegut sander head is new to the metal working field, it is not new in principle. For many years, it has been used successfully by the wood-working trade. Practical production experience in metal operations shows equally successful and economical results. The heads are cleaner in service, cooler-cutting, operate with less pressure and enable workers to produce better finishes with less effort. Their design and construction is simple. Loading, adjustment and operation are easy.



COATED PRODUCTS SHEETS • ROLLS • BELTS • DISCS SPECIAL SHAPES

BONDED PRODUCTS ABRASIVE WHEELS • STICKS, STONES AND RUBS • SPECIALTIES • SUPERFINISHING STONES • SPECIAL FORMS • ABRASIVE GRAINS AND FINISHING COMPOUNDS

FOR EVERY ABRASIVE APPLICATION ...CALL IN

CARBORUNDUM
TRADE MARK

Down with Insurance

(A MOST AMAZING AD)

IF this ad doesn't sell you on American Mutual, then you just don't care about *money!*

Here are plain, unadorned facts that simply shout for your attention . . .

In 5 years American Mutual helped reduce premium rates for an aircraft manufacturer from *13.6% above average for the field to 24.5% less than the average!*

In 3 years we helped a plastic manufacturer reduce premium rates from *7% to 32.5% below average for the field!*

An Alabama contractor was pleased to see his premium rates drop in 3 years from *29% above average to 7% below the average for the field.*

In 4 years we helped bring a Virginia company's rates down to *53% below the average.*

A Michigan chain and cable manufacturer cheered when we helped reduce his rates from *1.3% to actually 43% below average for his field.*

And so on and so on . . . we can show you dozens of dramatic cases where premium rates went down, down, down, thanks to our special I. E. Loss Control Service!*

AMERICAN MUTUAL...the first American liability insurance company

© 1949 AMERICAN MUTUAL LIABILITY INSURANCE COMPANY

Premiums! by Mr. Friendly

This *extra* service cuts down costly accidents . . . and ups production at the same time . . .

Wonder of wonders! . . . You get it at *no extra charge with every industrial policy!*

Have you ever heard of anything like it? . . .

The point is . . . if you like insurance, but don't like paying extra large premiums for it . . . why not look us up!

We'll absolutely convince you that no other liability insurance company offers as much as American Mutual!

Double-dare you to let us get you under our spell!

**Accident prevention based on principles of industrial engineering.*

MAIL THIS COUPON NOW

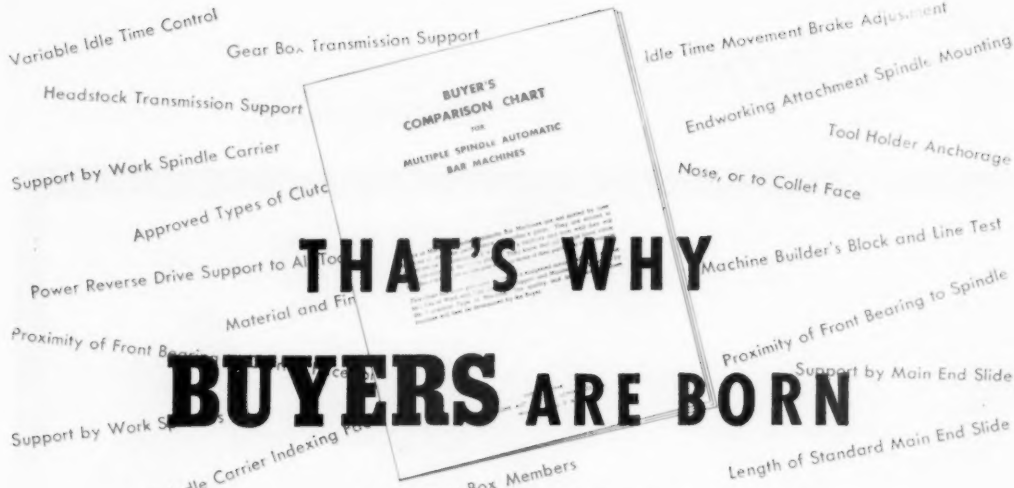
Dept. F-25, American Mutual Liability Insurance Company
142 Berkeley Street, Boston 16, Massachusetts

Without obligation, please *rush* me my *free* copy of *The All-American Plan*, showing me how to save as much as 20% on practically every kind of insurance, except life. Also, a most helpful, free, illustrated 98-page book, *Foremanship and Accident Prevention in Industry*.

*Name*_____

*Street*_____

*City*_____ *State*_____



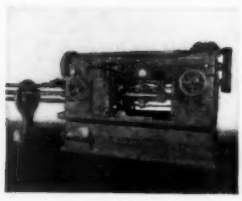
THAT'S WHY BUYERS ARE BORN

Buyers are indispensable in the evaluation of machine facility to meet particular requirements. If all machines were perfect there would be less need of Buyers. Perfect machines would meet all requirements.

But there are no perfect machines, and requirements vary with the many conditions at individual plants. The selection of a machine does not necessarily mean that it unqualifiedly fills all requirements. It may, in comparison with other machines, come closer to filling them.

In comparing one machine with others of the same type, an analysis chart can be very helpful. The subject should be thoroughly covered, and equal opportunity should be available to all machines compared.

CONE has made available an analysis chart for the horizontal type, multiple spindle, automatic bar machine. You will find it interesting and different. Write for free copy. There is no obligation.

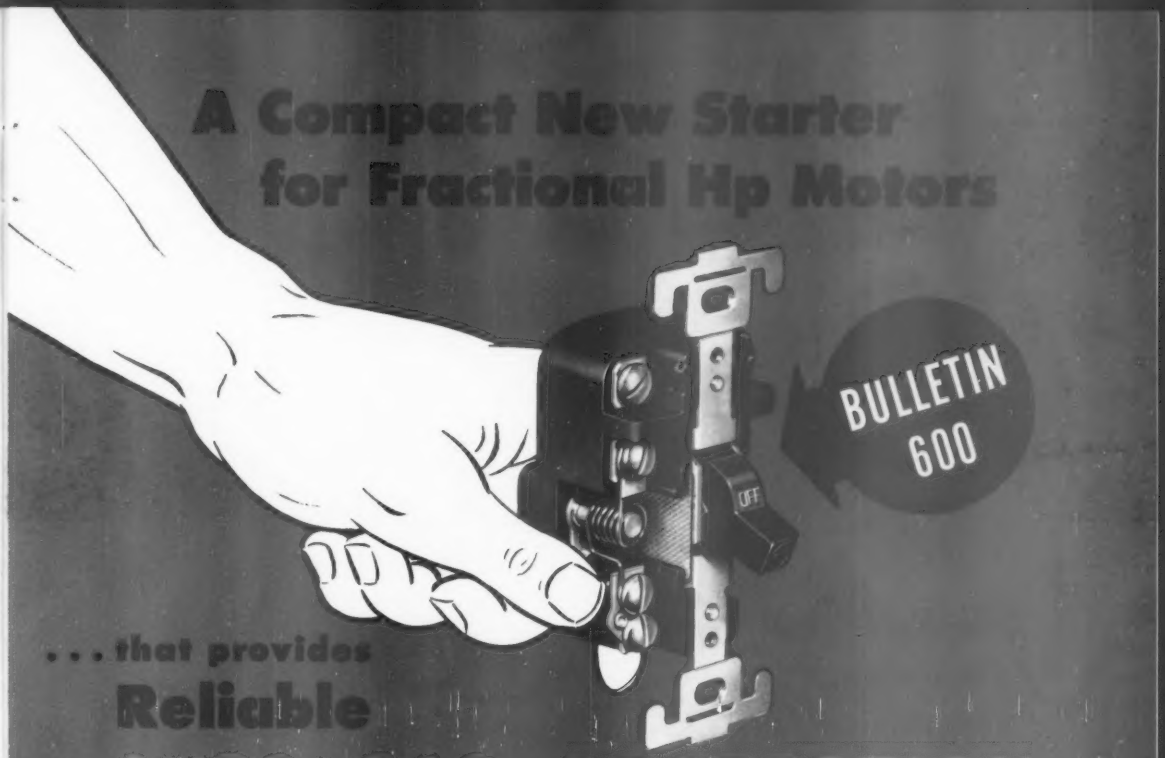


A comparison with ALL Automatics will lead you to

Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

A Compact New Starter for Fractional Hp Motors



. . . that provides

Reliable

OVERLOAD PROTECTION

Open view of enclosure for surface mounting

Closed view of enclosure for surface mounting

Bulletin 600 Switch with waterproof enclosure

Bulletin 600 Switch fits any standard switch box

Here is a small, manually operated starter that will satisfy the latest ruling of the National Electrical Code . . . which requires overload protection for a great many fractional horsepower motor applications. The Bulletin 600 Starting Switch is built in the single- and double-pole construction, and is rated one horsepower and less. Its dependable thermal breaker trips the switch under a sustained overload, protecting the motor against burn-out. When the overload is cleared, the breaker is easily reset with the switch lever. However, the switch cannot be held closed so long as the overload condition remains.

The Bulletin 600 Starter is available in enclosures to meet every service requirement. Send for complete data. Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wisconsin.

A-B Quality

ALLEN-BRADLEY

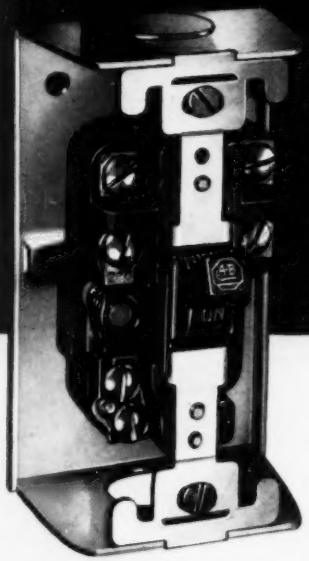
BULLETIN 600 STARTING SWITCHES

QUALITY

SEE OTHER SIDE

SAVE 30% to 40% of INSTALLATION TIME

on Starters for Small Motors (1 hp or less)



BULLETIN 600

Manual Starting Switches with Overload Protection

•

No Need to Remove Starter from Enclosure

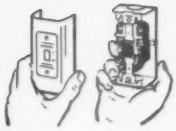
Installation of the Bulletin 600 Starting Switch is so simple that contractors have saved as much as ten minutes in installation time. In addition, they have found the switch exceptionally reliable.

•

GENEROUS WIRING SPACE
ATTRACTIVE APPEARANCE
SIMPLE DESIGN

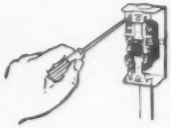
STEP 1—REMOVE COVER

Simply remove two screws on the front of the Bulletin 600 Starting Switch and the metal cover slips off, exposing the front and two sides of the switch.



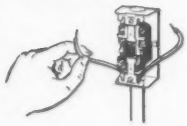
STEP 2—MOUNT UNIT

Mount the switch on the wall with two screws. Conduit openings on top, bottom, and back permit easy connection. No need to remove the starter from the box.



STEP 3—PULL IN WIRES AND CONNECT

Because the compact mechanism allows ample space, wires can be pulled into the box and connected to the terminals without removing the switch from the enclosure.



STEP 4—PUT COVER BACK ON

Finally, with the job completed, the cover is slipped back on, and two screws hold it firmly in place. The entire operation is simple and easy. It saves time and money.

A-B Quality

ALLEN-BRADLEY

MANUAL STARTING SWITCHES FOR SMALL MOTORS

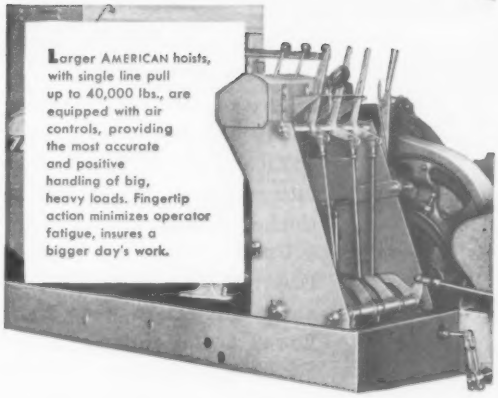
QUALITY

No ACROBATS need apply!

NO, and it doesn't take an India-rubber man to handle the controls of an AMERICAN hoist, either.

One big reason why AMERICAN hoists work more minutes per hour, more hours per day, is that controls are grouped to eliminate waste motion and are banked for effortless "reach". Hand levers are operated with a natural push-pull motion . . . not an awkward lateral action. Positive acting foot-brake keeps the load under command, and external contracting band friction clutch makes the hoist answer instantly to the operator's touch. Result: a rested, alert man at the controls.

AMERICAN Hoist builds the world's most complete line of hoists . . . from a quarter-ton Utility Hoist to Contractors' Hoists with 20 ton capacity. To find out about the model that fits your business best, write today for catalog.



Larger AMERICAN hoists, with single line pull up to 40,000 lbs., are equipped with air controls, providing the most accurate and positive handling of big, heavy loads. Fingertip action minimizes operator fatigue, insures a bigger day's work.

Utility Hoist 500 lbs. S.L.P.
Single Drum Hoist 2,500 lbs. S.L.P.
Double Drum Hoist 7,500 lbs. S.L.P.
Three Drum Hoist 10,000 lbs. S.L.P.
Four Drum Steam Hoist 25,000 lbs. S.L.P.
Three Drum Hoist 40,000 lbs. S.L.P.

American Hoist

and DERRICK COMPANY

St. Paul 1, Minnesota

Plant No. 2: So. Kearny, N. J.

Sales Offices: NEW YORK • PITTSBURGH • CHICAGO

AMERICAN HOIST & Derrick Co.
ST. PAUL 1, MINNESOTA

MAIL THIS COUPON TODAY! 9103

● Please send catalog showing hoists for industry.

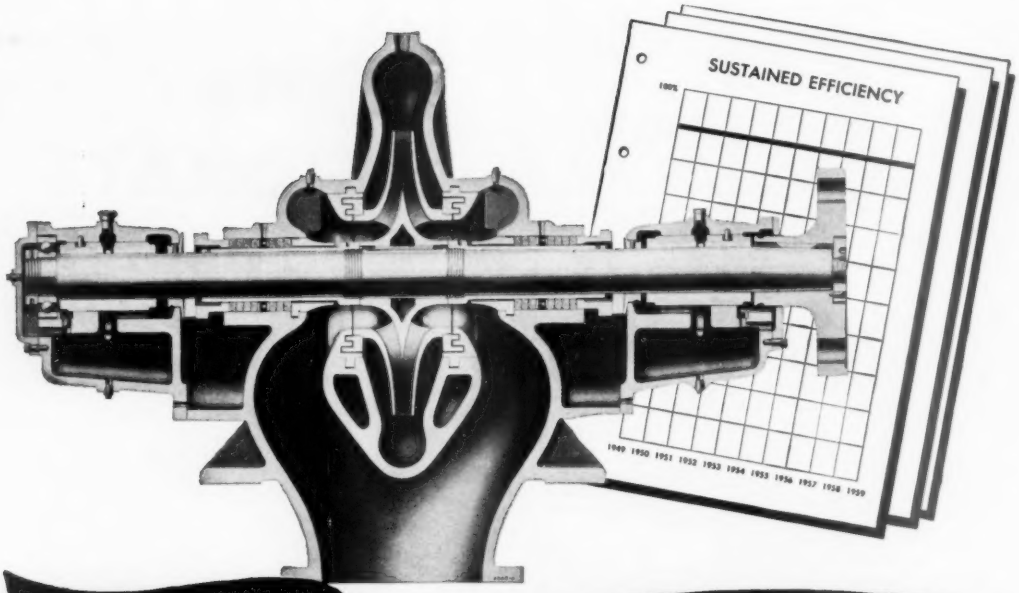
NAME_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

20



DE LAVAL
LABYRINTH RINGS

KEEP PUMP EFFICIENCY HIGH!

Here's why: Look at the diagrams at the right and you can see how the leakage from discharge to suction at the running joint is kept to an absolute minimum by the flow retarding action of the labyrinth passages.

Unlike a flat ring, the De Laval large clearance labyrinth ring does not depend upon close clearances, subject to wear and enlargement. The flow retarding action of the labyrinth keeps efficiency high for the life of the pump and you benefit by low power costs and low maintenance year after year.

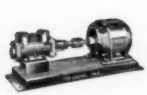
When you buy a centrifugal pump, *specify De Laval*... it pays in the long run.

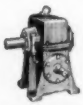
SEND FOR CATALOG 10-13-J.

De Laval large clearance labyrinth wearing ring. Note flow retarding action of tortuous passage.

Ordinary flat wearing ring. Note that flow retarding action depends upon close clearances.

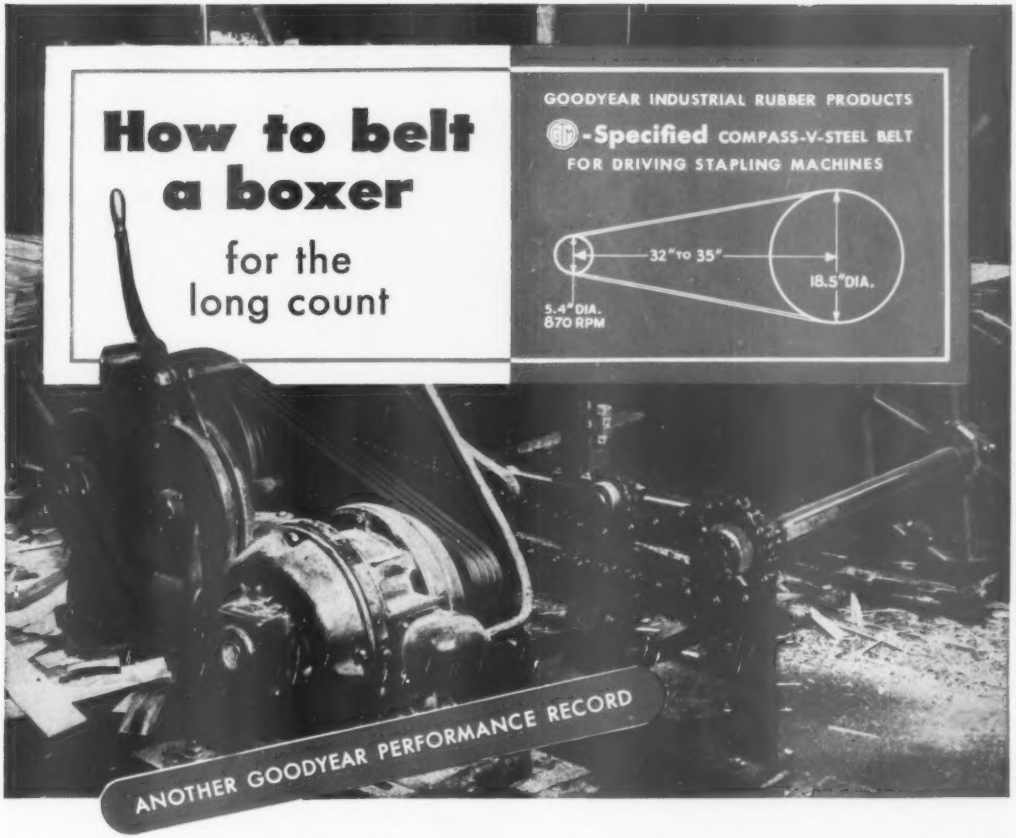
DE LAVAL STEAM TURBINE COMPANY • TRENTON 2, NEW JERSEY





DE LAVAL

TURBINES • HELICAL GEARS • WORM GEAR SPEED REDUCERS • CENTRIFUGAL PUMPS • CENTRIFUGAL BLOWERS & COMPRESSORS • IMO OIL PUMPS



A FLORIDA box manufacturer has five stapling machines in his plant—"boxers" that turn out fruit crates used by citrus growers. Power for these machines was formerly supplied by ordinary-type V-belts. In spite of frequent take-ups, these belts stretched beyond usefulness—had to be replaced about every six months.

Frequent downtime and lost production led the plant owner to call in the G.T.M.—Goodyear Technical Man. He studied the drive, recommended re-belting with Goodyear COMPASS-V-STEEL belts. That was over 18 months ago. And the belts haven't been taken up since they were installed. They're still in service—with plenty of useful life left *after giving 200% better service than the best previous record.*

Belt service records like this one are an old story where COMPASS-V-STEEL belts are concerned. Their unique construction bodies the belt with rugged steel cables in the load-carrying section. That means far greater belt strength—highest heat resistance—practically zero stretch. COMPASS-V-STEEL belts pull heavier loads—assure longer life on present drives or equal efficiency with fewer belts at higher or lower belt speeds.

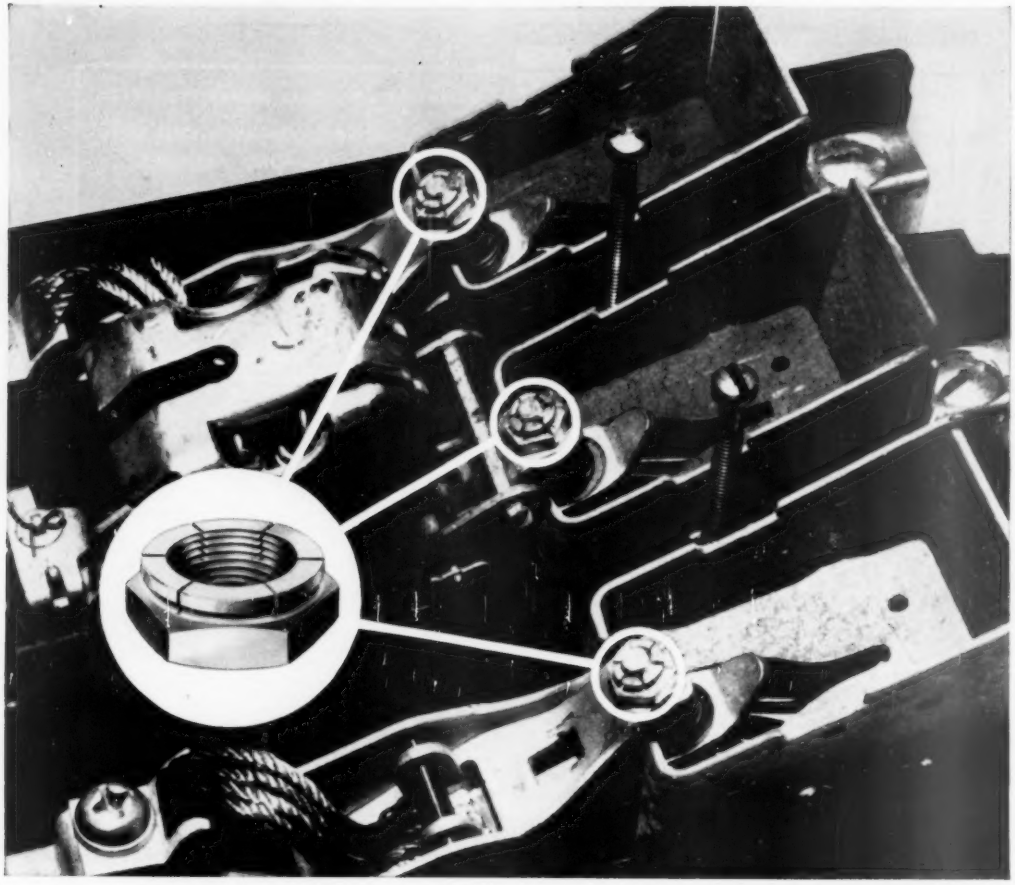
COMPASS-V-STEEL belts are available in a standard range of sizes. Ask the G.T.M. for full details, or write Goodyear, Akron 16, Ohio.

***FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING AND TANK LINING** built to the world's highest standard of quality, call your nearest Goodyear Industrial Rubber Products Distributor.*

GOODYEAR

Compass—T.M. The Goodyear Tire & Rubber Company

THE GREATEST NAME IN RUBBER



"FLEXLOC" Self-Locking Nuts successfully resist severe impact vibration in this I-T-E circuit breaker. In addition, they eliminate the use of lock washers, jam nuts, etc., with resulting simplification of parts and assembly.

FLEXLOC SUCCESSFULLY RESISTS IMPACT VIBRATION

More and more designers, engineers and manufacturers are using "FLEXLOC" Self-Locking Nuts to solve a growing variety of lock-nut problems. These men are becoming increasingly aware of "FLEXLOC'S" unique features. They like the way the "FLEXLOC" automatically locks itself in any position on a threaded member, and can be depended on to stay tight—vibration or no vibration. They also like the fact that every "FLEXLOC" thread, including its locking threads, carries its full share of the load. They recognize and fully appreciate the value of its one-piece, strong construction—nothing to shift, work loose or forget. And they realize the important advantage of the live, resilient locking sections which are processed to have uniform and controlled torques, permitting the "FLEXLOC" to accommodate itself to a wide range of tolerances and to be used over and over again without appreciable loss of torque. In addition, the "FLEXLOC" can be made from any of the conventional nut materials and is unaffected by temperatures usually encountered in the field of Mechanical Engineering.

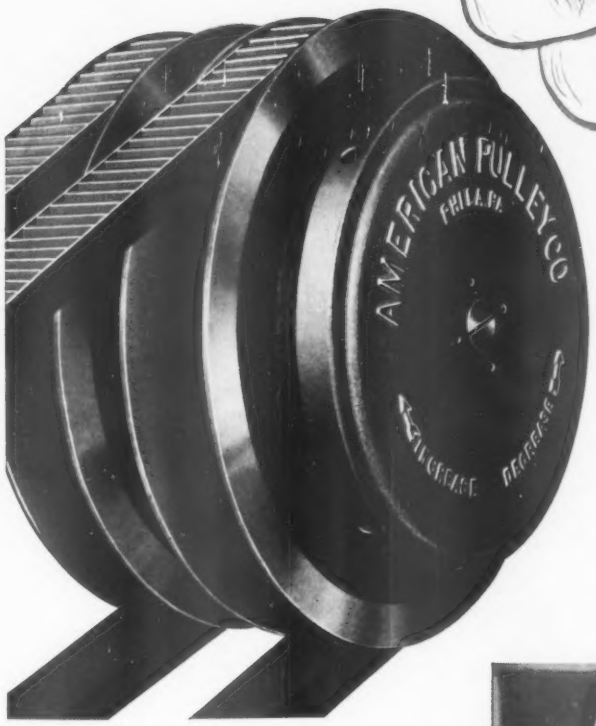
Write for our folder Form 683 and free samples of "FLEXLOC" nuts today.

SPS STANDARD PRESSED STEEL CO.

BOX 546 JENKINTOWN, PENNSYLVANIA

"Serving Industry continuously since 1903 through Industrial Distributors"

Machine Efficiency Like You've NEVER Had Before!



● If you've ever wanted a quicker, easier way to change speeds on your machinery, investigate the new American Wide-Range Adjustable-Diameter Wedgbelt Drive. Here is a drive that is so different—gives your machinery so many new advantages —that it is hard to realize the amazing job it can do until you see it operate. One unit does the work of a whole battery of various size sheaves! It's the answer to real "stop watch efficiency" in your variable-speed applications where a single R. P. M. may mean the difference between unprofitable and profitable operation. Your note starts complete information on its way. Write today.

The American Pulley Company

4210 WISSAHICKON AVENUE
PHILADELPHIA 29, PA.

Ears THAT LISTEN FOR ENGINE TROUBLE ...SAVE YOU COSTLY *"Headaches"*

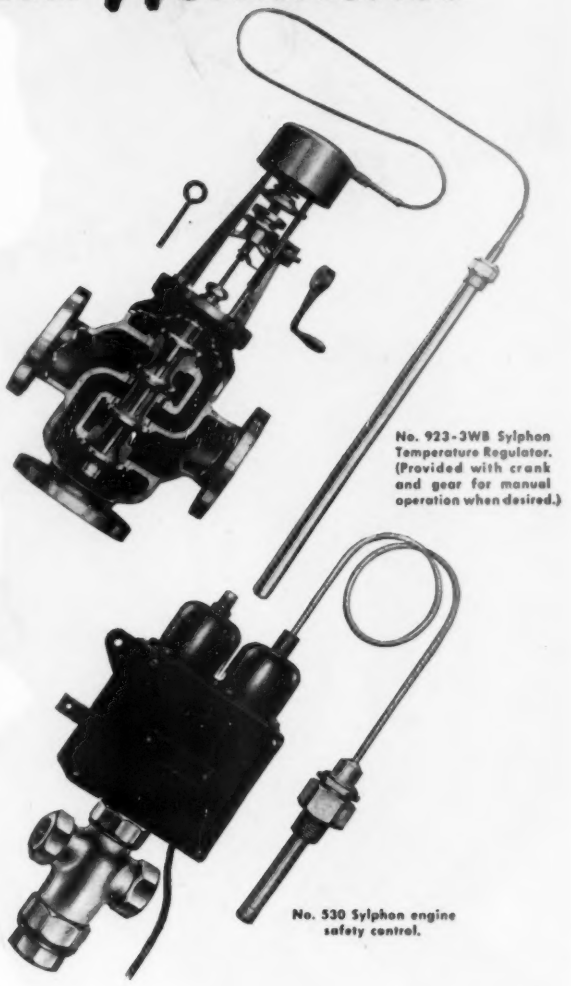
These dependable controls are always on the job—even when you can't be. Alert to the slightest whisper of trouble, they can save you engine "headaches", help prevent expensive shutdowns, damage or repairs.

Just see how they help you: The No. 530 Sylphon engine safety control gives positive protection against overheating; it sounds an alarm—or stops the engine —at any time the cooling water temperature goes above, or the lube oil pressure goes below safe limits.

The 923-3WB Sylphon Temperature Regulator is equipped with a 3-way valve which is automatically positioned to direct all or part of the water through a by-pass. It maintains constant volume of water through pump and engine . . . gives quick "warm-up". . . improves performance.

These Fulton Sylphon controls are equally effective with diesel, gas or other internal combustion engines. Like all Sylphon controls, they're rugged and reliable... built to serve you long and well.

Bulletin PF-817 gives you complete details. Send for it today.



No. 923-3WB Sylphon Temperature Regulator. (Provided with crank and gear for manual operation when desired.)

No. 530 Sylphon engine safety control.

"Everything's under control"

FIRST WITH BELLOWS

Temperature Controls • Bellows Devices • Bellows Assemblies

FULTON SYLPHON
DIVISION

ROBERTSHAW-FULTON CONTROLS CO. KNOXVILLE 4, TENN.

Canadian Representatives, Darling Brothers, Montreal

Faster Feed... Lower Costs!

MORE WORK BETWEEN GRINDS

BOSS CUTTERS

with T-J CUTTERS

CHERRYING CUTTERS

ROUGHING CUTTERS

ANGLE CUTTERS

END MILLS

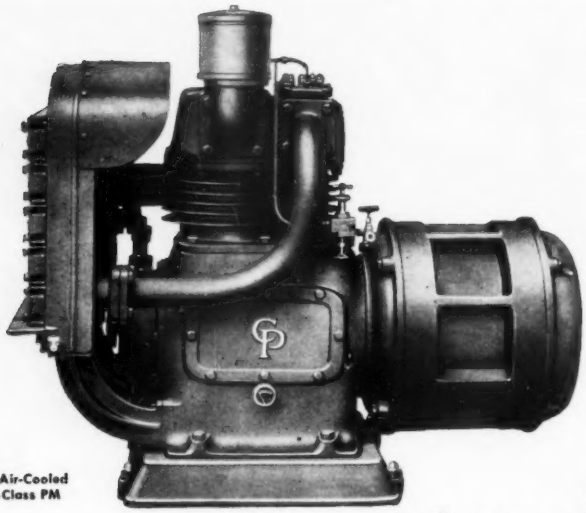
T-J Die Sinking Milling Cutters "have what it takes" for cutting tough die steels with *speed* and *accuracy!* They're *extra sturdy*... hold a sharp edge longer... less breakage! Made from a standard, extremely high grade steel... properly machined... scientifically heat-treated and accurately ground. Wide range of styles and sizes ... ready for your tough jobs! Send for new catalog. The Tomkins-Johnson Co., Jackson, Mich.

This T-J Cutter at work on a connecting-rod die block for a board drop hammer. Material being milled is "Hardtem" die steel. A cutter of right design and heat treatment for this high speed work in tough die steels, making possible maximum efficiency of these machines.

FOR TOUGH JOBS SPECIFY T-J

TOMKINS-JOHNSON

DIE SINKING MILLING CUTTERS



CP Two-Stage Air-Cooled Compressor—Class PM

compressed air *anywhere* – without waste

CP Two-Stage Air-Cooled Compressor—Class PB

In many large and medium sized plants air is needed in isolated locations. These small, compact CP compressors may be installed independently of the main air system, dispensing with long air lines. They are also ideal for off hour operations.

In smaller plants, the entire air requirements may be met most economically with these small, efficient compressors.

Built to the same high standards as the large CP compressors, Class PM two-stage air-cooled compressors are available in sizes from 139 to 445 c.f.m. piston displacement, with built in motor (as illustrated) and with flexible coupling or V-belt drive.

Class PB-20 Compressors are available in three sizes: 7½, 10 and 15 HP, with piston displacement ranging from 39 to 82 c.f.m. Illustrated is the tank-mounted type.

Write for complete information

CHICAGO PNEUMATIC TOOL COMPANY

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PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
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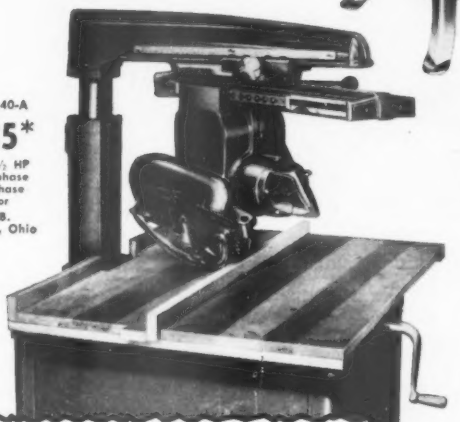
2 DELTA-MILWAUKEE® MACHINES THAT CUT TIME AND COSTS FOR PLANT MAINTENANCE JOBS

DELTA MILWAUKEE®

10" circular saw and 6" jointer mounted on one steel stand

$235.75* without motor or switch rod

Your nearby Delta distributor can supply these popular machines on easy credit terms. Look for his name under "Tools" in the classified section of your telephone directory.



Model 40-A

$385* with 1½ HP single-phase or 3-phase motor F.O.B. Norwalk, Ohio

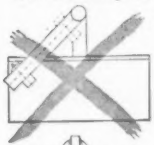
1 Delta Saw-Jointer Combination

Two machines mounted together to save floor space. Extra convenience cuts your costs, boosts your output. 10" saw blade cuts 3¼" stock. Rips to center of 50" panel. Jointer surfaces boards 6" wide; cuts rabbets ½" deep. Saw table tilts 45° to right. Either machine may be used singly or both together — by one man or two. There is no interference between saw and jointer. Both are driven by same motor. See Catalog B-48 for complete description. Send coupon for your copy.

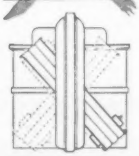
2 Delta Multiplex Radial-Arm Saw

Like a whole shopful of handy tools in one. It rips, cross-cuts, miters, shapes, tenons, plows, rabbets — and does many more operations. You can put the cutting arm at any angle — and get 100% mitering capacity. Model 40A, shown, uses a standard 12" blade, although a 14" blade can be used. It has a rip capacity up to 3¼". Your Delta distributor has Multiplex models in a range of sizes, with motors of ½, ¾, 1½, 3, 5, 7½, and 10 HP, and rip capacities up to 6". Send coupon for descriptive literature.

You get *more capacity*, with a Delta Multiplex Radial-Arm Saw!



Old Way — Saw arm pivots from column. Practically no mitering capacity at 45°, not much at 30°, and almost none beyond 45° on left-hand miters.



Modern Delta Multiplex Way — Saw arm is center-pivoted. Set quickly to cut any miter — right- or left-hand — at full capacity up to 90°. Saw rotates through 360° in unlimited number of positions.

DELTA MANUFACTURING DIVISION
ROCKWELL MANUFACTURING COMPANY
MILWAUKEE 1, WISCONSIN

WM-27

*Prices subject to change without notice

TEAR OUT COUPON AND MAIL TODAY!

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Send me the following: ☐ Catalog B-48
☐ Literature on Delta Multiplex Radial-Arm Saws

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Company.....
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Textile roll with body of Meehanite Metal and cover of bronze, both cast centrifugally by Shenango-Penn to assure exceptional strength and life. Shenango-Penn offers modern machining facilities for completely finished parts (as shown) or any stage of completion desired.

How this textile roll might smooth out a problem for YOU

IF SYMMETRICAL parts (such as sleeves, liners, rings, bushings, rolls and roll covers) figure in the machinery you build or operate, the above roll has qualities that could probably save you time and money.

The roll's body is Meehanite Metal—a big advantage in itself. The cover is bronze. Both are Shenango-Penn *centrifugal* castings. This means fine-grain, *pressure-dense* metal, assuring exceptional strength and hardness, and permitting the finest kind of finish. You just can't beat this combination for resistance to wear, breakage and distortion . . . for *long life!*

That's why Shenango-Penn is continually producing symmetrical, annular and tubular parts, large and small, for many services in many industries. Send for free bulletins on either ferrous or non-ferrous made-to-order centrifugal castings or on *centrifugally cast* bronze bushing stock in standard sizes.

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ALL BRONZES • MONEL METAL
NI-RESIST • MEEHANITE METAL®

Candid Camera View of plant operating costs

FOCUSED on operating costs of a textile plant, a truly candid camera would record this view of valves in proper relation, cost-wise, to other equipment. By the simple photo-magic of showing *all* valves in the plant as *one* valve, the picture points up an important fact—that valves, collectively, are a major investment in *any* plant, *any* large building where operation involves fluid control.

IT PAYS MANAGEMENT to keep this fact in mind. With wages and material costs the highest ever, valve maintenance costs must be watched as carefully as operating expense of larger plant units

EXCESSIVE MAINTENANCE of one inferior valve is insignificant, but multiplied by thousands, it is a serious drain on operating budgets.

JENKINS BROS. helps you meet this problem two ways. First, by building extra endurance into Jenkins Valves, making them the longest-lasting, lowest-upkeep valves that money can buy. Second, with advice from Jenkins Engineers on any question of proper selection, installation, or maintenance.

For all new installations, for all replacements, rely on Jenkins quality and engineering for lowest valve costs in the long run. Sold through leading Industrial Distributors.

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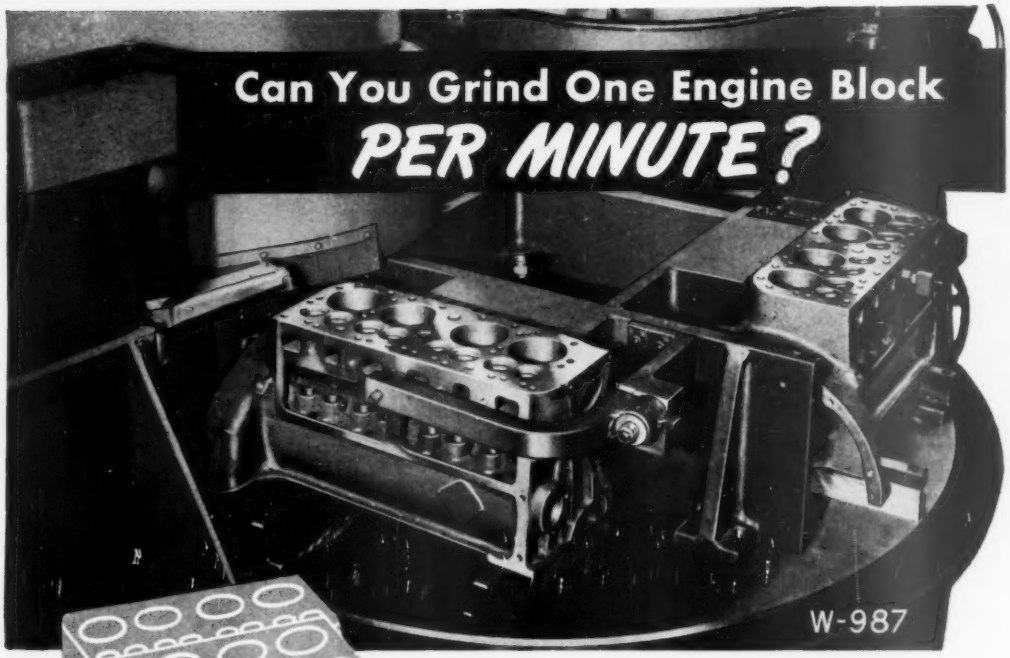
Jenkins Bros., 80 White St., New York 13; Bridgeport, Conn.; Atlanta; Boston; Philadelphia; Chicago; San Francisco. Jenkins Bros., Ltd., Montreal.

"PREVENT VALVE FAILURE" is a 28-page guide to valve economy, fully illustrated, with case histories of valve damage, and recommendations for its prevention by proper selection, installation, inspection, and maintenance. FREE on request. Write: JENKINS BROS., 80 White St., New York 13, N. Y.

LOOK FOR THIS TRADE JENKINS MARK DIAMOND MARK SINCE 1864

JENKINS VALVES

Types, Sizes, Pressures, Metals for Every Need



BLANCHARD 16-A2 GRINDS TRACTOR CYLINDER BLOCKS CONTINUOUSLY

Here is a good example of mass grinding of larger pieces at a greater profit.

A four station mechanical clamping fixture, designed and built by Blanchard, continuously rotating on the 55" diameter chuck of a No. 16-A2 Blanchard Surface Grinder, presents the Engine Blocks to the grinding wheels.

The material is cast iron and .010" of stock is removed from each surface—*to a flatness of .0015".*

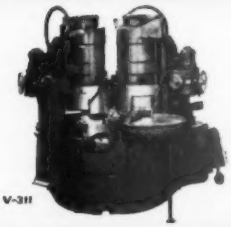
Production is 60 pieces per hour including loading and unloading time.

If you have larger engine cylinder blocks to grind, the Blanchard 22-A, with proper number of spindles, will do the job. Let Blanchard show you how.

PUT IT ON THE BLANCHARD

Whatever type of flat surface machining your parts may require—simple "cleaning up," rough grind and finish grind in one operation, or very flat surfaces with fine finish and held to close limits—there is no more profitable method, in most cases, than to "Put it on the Blanchard."

If you machine flat surfaces . . . bring your problems to Blanchard engineers.



BLANCHARD

The BLANCHARD MACHINE COMPANY

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DU PONT "CORDURA" RAYON . . .

. . . DELIVERS THE PUNCH

Bursting strength of air hose can be increased up to 50% by a reinforcement of Cordura* yarn. The high strength of "Cordura" also makes it possible to reduce weight of many types of hose, yet they have far greater resistance to flexing, strain and internal friction.

. . . DELIVERS THE POWER

Widely used in V-belts, "Cordura" has virtually eliminated "stretch." That means more power from each belt . . . fewer take-ups . . . less maintenance. And V-belts last much longer when they're made with Du Pont "Cordura" High Tenacity Rayon.

. . . DELIVERS THE CARGO

For conveyor belts, "Cordura" offers high strength plus remarkable troughability. Its high unit strength makes possible lighter belts that are easier to set up and work with. And it supplies the necessary tensile strength for long-lift belts.

YOU CAN RELY ON "CORDURA" TO DELIVER HIGH STRENGTH . . . AT LOW COST

Inherently stronger than natural fibers commonly used, and usually more economical, "Cordura" is a yarn you can't afford to overlook. Perhaps the uses described above suggest still another application to you. Write us about it . . . and tell us if you need data on the performance of this yarn under unusual operating conditions. We'll be glad to give you a detailed analysis of the application you have in mind, along with other helpful information. Write Rayon Div., E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware. *REG. U.S. PAT. OFF.

DU PONT "CORDURA" HIGH TENACITY RAYON

DU PONT

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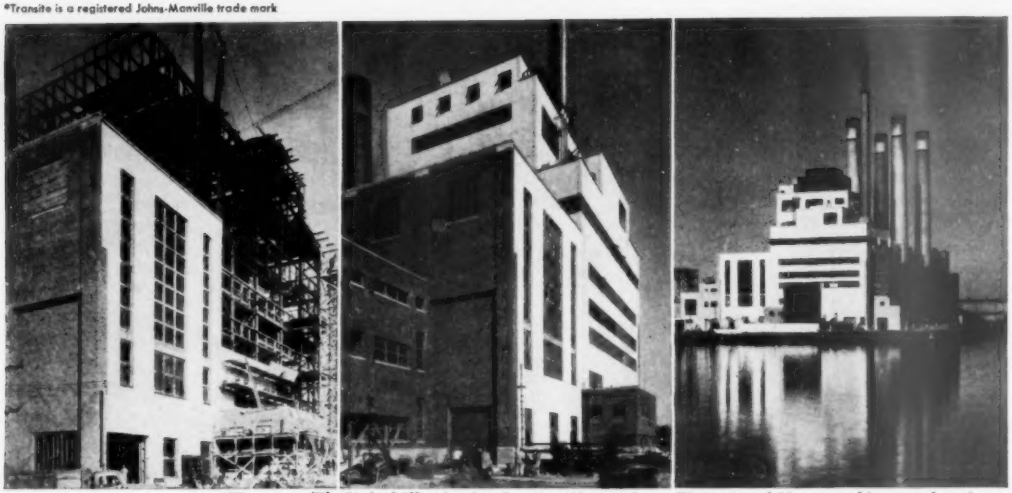
BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

for RAYON . . . for NYLON . . . for FIBERS to come . . . look to DU PONT

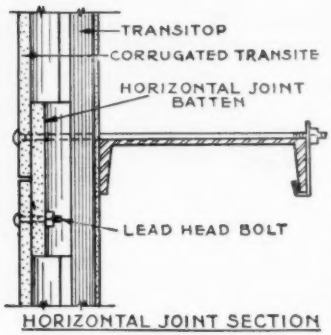
CORRUGATED TRANSITE* ... *for Curtain Walls*

*Transite is a registered Johns-Manville trade mark



The United Illuminating Co., New Haven, Conn.; Westcott and Mapes, architects and engineers

Asbestos Corrugated Transite reduces load-bearing factor 83% on new power plant addition! Transite sheets give attractive, streamlined appearance ... and they can't rot, rust, or burn.



HORIZONTAL JOINT SECTION

● Here's a case in which a unique form of asbestos wall construction solved a tough building problem.

The addition planned was to be almost twice the height of the original building, yet where the two joined, existing foundations were to be used. This meant that the new bearing wall with all its extra height should weigh no more than the old wall.

After careful study, it was decided to use the Johns-Manville Industrial Curtain Wall, a system of dry wall construction which combines J-M Corrugated Asbestos Transite with J-M Transitop (Insulating Board faced with Flexboard).

This type of construction, compared with solid masonry, reduced the load-bearing factor from 120 to 20 pounds per square foot! It also provided fire protection, insulation, and permitted the use of less extensive pilings and foundations for the rest of the building.

Architects and engineers are constantly discovering new uses for J-M Corrugated Asbestos Transite, not the least of which is its surprisingly effective function in attractive, modern design.

Send for new brochure which may help you on your next project. Johns-Manville, Box 290, New York 16, N. Y.

EASY TO BOLT TO STEEL

EASY TO SAW

EASY TO DRILL

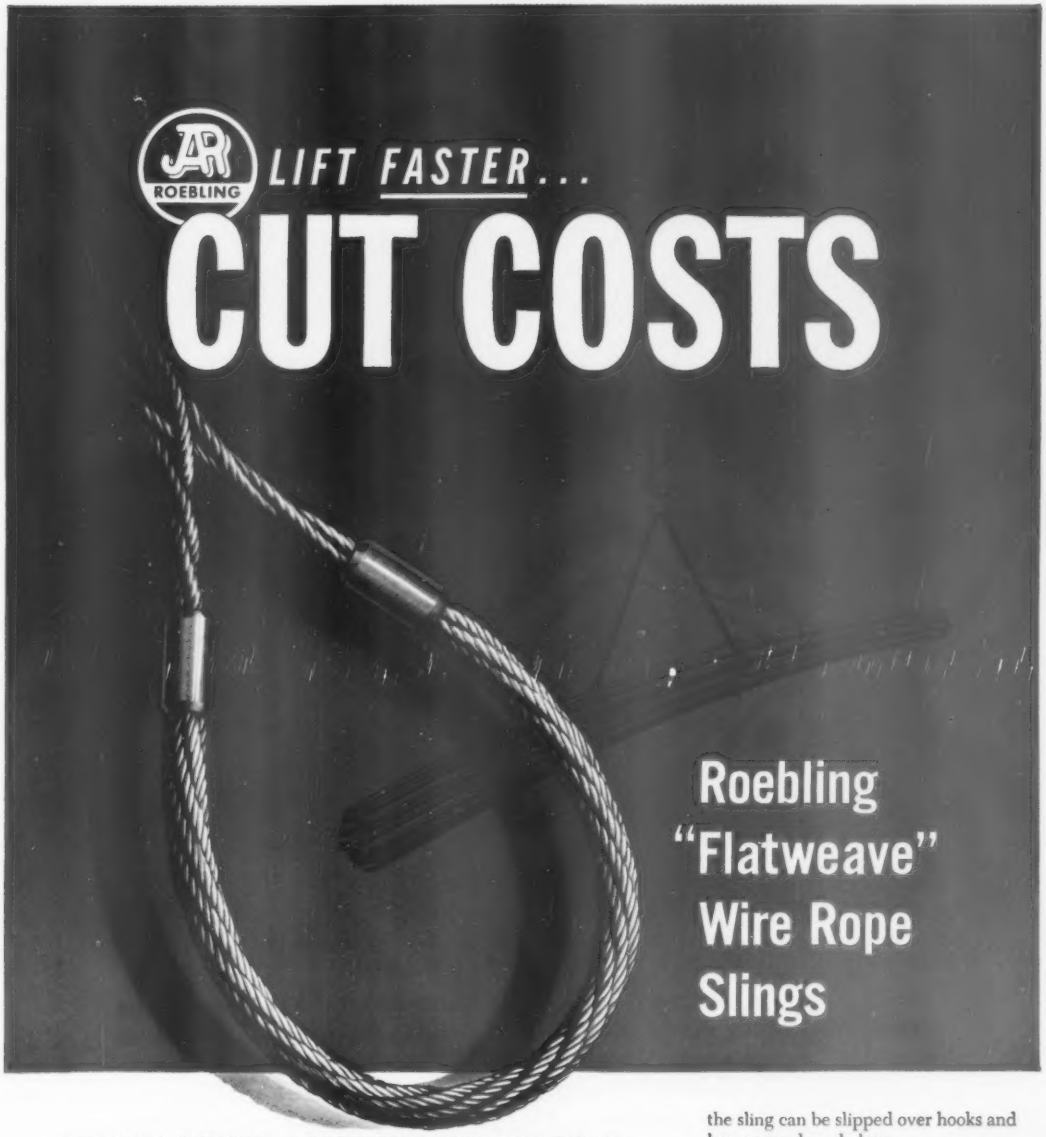
EASY TO NAIL TO WOOD

Johns-Manville *Asbestos* **CORRUGATED TRANSITE**

JR ROEBLING

LIFT FASTER...

CUT COSTS



USED IN DIRECT CONTACT WITH THE LOAD

"TIME IS MONEY" . . . and you can often save both with Roebling "Flatweave" Slings. For one thing, "Flatweaves" are easy to handle . . . they pass readily through and under loads. For another, they can be used without fittings . . . thus permitting all hoisting effort to be applied to the load itself.

In "Flatweave" Slings six wire ropes are woven together side by side to form a wide, flat surface. This is an exclusive Roebling development and provides a broad bearing area that prolongs the life of the sling. Loops at each end of the sling can be slipped over hooks and lugs or used as chokers.

Get the full story of Roebling "Flatweave" Slings, along with data on the full Roebling line—an economical sling for every moving, hoisting and loading job. It's all in the "Roebling Sling Data Book" . . . yours on request. John A. Roebling's Sons Company, Trenton 2, New Jersey.

WRITE OR CALL THE ROEBLING FIELD MAN AT YOUR NEAREST • ROEBLING OFFICE AND WAREHOUSE

Atlanta, 934 Avon Ave. ★ *Boston*, 51 Sleeper St. ★ *Chicago*, 5525 W. Roosevelt Rd. ★ *Cleveland*, 701 St. Clair Ave., N. E. ★ *Denver*, 1635 17th St. ★ *Houston*, 6216 Navigation Blvd. ★ *Los Angeles*, 216 S. Alameda St. ★ *New York*, 19 Rector St. ★ *Philadelphia*, 12 S. 12th St. ★ *Pittsburgh*, 855 W. North Ave. ★ *Portland, Ore.*, 1032 N. W. 14th Ave. ★ *San Francisco*, 1740 17th St. ★ *Seattle*, 900 First Ave.

ROEBLING

☆ A CENTURY OF CONFIDENCE ☆

this is CMH REX-FLEX

flexible stainless steel hose

While the need rarely arises, tying CMH REX-FLEX into a knot does illustrate the high degree of flexibility of this *all-metal* corrugated stainless steel hose. And the same characteristics of stainless steel that make REX-FLEX so flexible also give it the ability to withstand extreme cycles of vibration, flexation and variplane motions.

Light in weight...high in strength... leak-proof . . . and highly resistant to corrosion, REX-FLEX is the answer to the problems of handling searching and corrosive liquids and gases where there is motion.

CMH REX-FLEX is made in sizes from 5/16" through 6" I.D. Available with helical or annular corrugations, with or without metal braid covering. Ends may be flanged or equipped with fittings to meet your requirements. Write for complete information.

CMH—ONE dependable source
for every flexible metal hose requirement

• CMH manufactures all standard types of flexible metal hose, both convoluted and corrugated, in a variety of metals; expansion joints for piping systems; stainless steel and brass bellows; various conduits and special assemblies of these components.

CHICAGO METAL HOSE CORPORATION

CMH

Leaders in the Science of Flexonics
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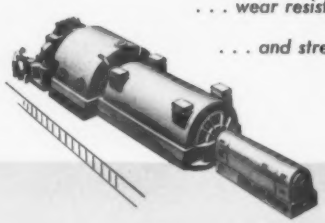
Plants at Maywood, Elgin and Rock Falls, Illinois
In Canada: Canadian Metal Hose Co., Ltd., Brampton, Ontario
FLEXON . . . . . identifies CMH products which have served industry for more than 47 years.

Plastics where plastics belong

for dimensional stability

. . . wear resistance

. . . and strength



Synthane pump bearings used in this Allis-Chalmers vertical mixed flow pump illustrate an interesting application of Synthane requiring stability of dimensions within close tolerances under conditions of severe exposure to wear and water. Other interesting applications for Synthane result from its many additional properties in combination—a few of which are high dielectric strength, good structural strength, light weight, low moisture absorption, and corrosion resistance.

In the Allis-Chalmers pump shown above Synthane was selected as standard bearing material in all units pumping clear water. Tests indicated that Synthane did not swell excessively when constantly immersed in water. In these installations water is the only lubricant.

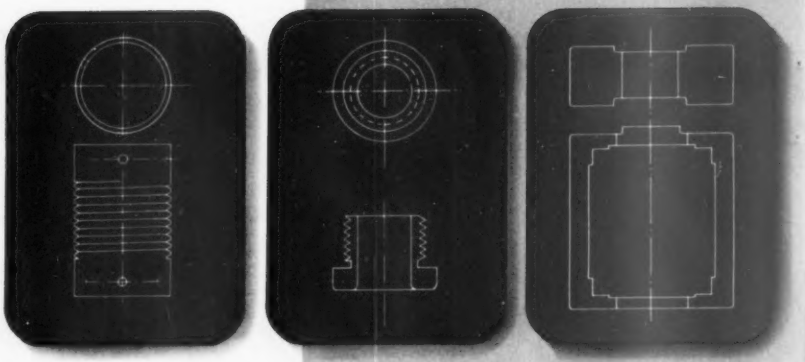
These few of Synthane's many desirable qualities may suggest its use in your products or process. If so, why not let us help with design, material, or fabricated parts. Write today for the Synthane Plastics Catalog. Synthane Corporation, 4 River Road, Oaks, Pennsylvania.

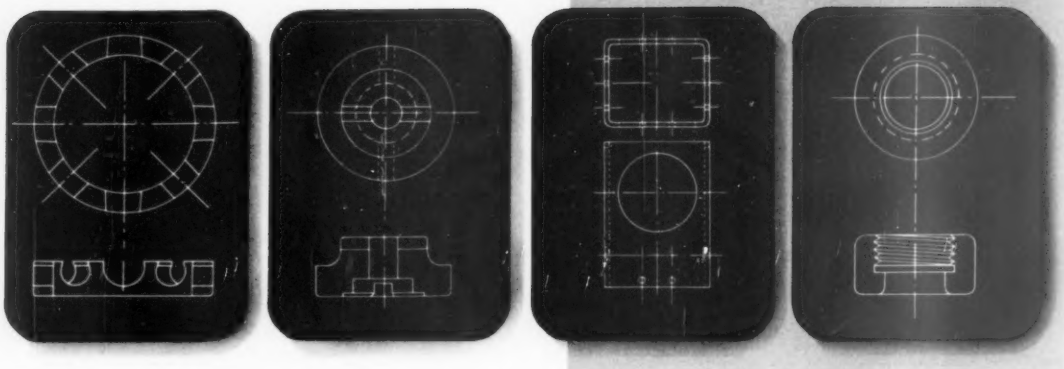
SYNTHANE **where Synthane belongs**

DESIGN • MATERIALS • FABRICATION • SHEETS • RODS • TUBES
FABRICATED PARTS • MOLDED-MACERATED • MOLDED-LAMINATED

Question:

What 3 points have these 7 JOBS in common?





ANSWER:

1. All of them have an unusual combination of requirements.
2. All of them are made from Synthane laminated plastics.
3. All of them are machined from Synthane tubes or rods.

QUESTION: *What properties in combination?*

ANSWER:

Properties such as structural strength; light weight; toughness; moisture and corrosion resistance; dimensional stability; hardness; abrasion resistance; low coefficient of expansion; and desirable characteristics for electrical applications, as low power factor, high dielectric strength, low dielectric constant.

QUESTION: *Is Synthane easy to machine?*

ANSWER:

Synthane tubes and rods are easily and quickly machined by standard shop equipment, including saws, drills, lathes, millers, punch presses, and automatic screw machines.

QUESTION: *Does Synthane produce finished parts?*

ANSWER:

Synthane produces rods and tubes, helps you design for use of plastics, and delivers top quality finished parts. Send for the Tubing Folder today.

SYNTHANE CORPORATION, 4 RIVER ROAD

Oaks, Pennsylvania

Please send me the Synthane Tubing Folder by return mail

Name _____

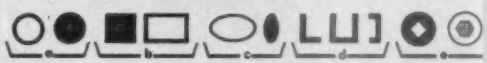
Company _____

Title _____

Address _____

City _____ *Zone* _____ *State* _____

Synthane produces a wide variety of shapes. For example: a—round tubes or rods, b—square or irregular tubes or rods, c—oval tubes or rods, d—angles or channels, e—irregular bore or insert.



Standard round tubing is always a little more economical to use, but if your needs call for an irregular shaped section, it will pay you to inquire about Synthane's diversified line of rods and tubes.

Specifications:

Diameters: **Rod—⅛" to 4" O.D.**
Tubing—⅛" to 22" I.D., O.D. to specifications.
(Molded tubing to 4" O.D. only.)

Lengths: **18" to 36", longer on order**

Colors: **Natural (Tan) or black**

Finishes: **Ground, buffed or varnished**

For diameter or wall thickness tolerances, standards of quality for tensile and compressive strength, dielectric strength, density, percent of moisture absorption, power factor, and dielectric constant, write for descriptive Tubing Folder.

SYNTHANE

SYNTHANE CORPORATION OAKS • PENNSYLVANIA

Representatives in ALL Principal Cities

"No Magic Needed Here

When you need pipe in a hurry, you don't have to be a magician. Just pick up your phone and call your Spang CW Distributor. Tell him what you want—where you want it and when . . . he'll get it there on time. Spang CW Pipe Distributors pride themselves on the outstanding service they provide.

That's why so many of them handle well-known lines of merchandise like Spang CW . . . the pipe that's famous for the following qualities:

- Easy to Cut, Bend, Thread or Weld
- Uniform Lengths
- Smooth Inside Surface
- Sound Weld from End-to-End of Pipe
- Accurate Threaded Ends
- Accurate Size
- High Concentricity.

Call your Spang CW Distributor first whenever you need pipe, valves, fittings or other piping materials. You can depend on him for prompt, courteous service.

SPANG-CHALFANT

Division of The National Supply Company

EXECUTIVE OFFICES: PITTSBURGH, PA.

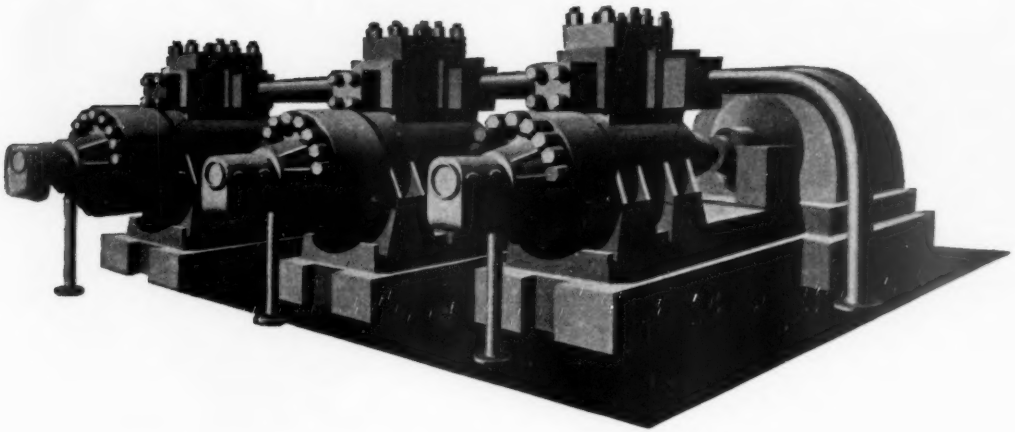
District Sales Offices: Atlanta; Boston; Chicago; Detroit; Houston; Los Angeles; New York; Philadelphia; Pittsburgh; St. Louis; San Francisco

SPANG CW

QUALITY *that is recognized wherever pipe is used*

GULF HARMONY OIL selected for the World's Largest Industrial Centrifugal Pump

to insure top performance, long life



Largest pump capacity in terms of pressure and volume of any industrial centrifugal pump installation in the world is found in the power plant for the 18,000-ton forging press at Wyman-Gordon Products Corporation. Capacity is 1500 gal. per min. at 5300 lbs. per sq. in.—enough energy to pump the water contained in twelve tank cars in one hour from sea level to the top of Mount Whitney (altitude 14,510 ft.)

This unusual installation consists of three 8-stage units connected in series. Pressure increase through each pump is 1750 lbs. per sq. in. Each is driven by a 1,000 hp motor, and has an individual lubricating system which supplies Gulf Harmony Oil, noted for its successful performance under heavy loads, to the pump and motor bearings. Gulf Harmony Oil is rust and foam inhibited and has outstanding resistance to oxidation — helps insure long trouble-free pump and motor life.

Another example of how Gulf quality oils and greases have been selected to protect the huge investments in the world's largest equipment of various types. Make sure your plant is getting the advantages of recent developments in scientific lubrication. Write, wire, or phone your nearest Gulf office today and ask a Gulf Lubrication Engineer to call.

Gulf Oil Corporation · Gulf Refining Company

Division Sales Offices: Boston · New York · Philadelphia · Pittsburgh
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GULF INDUSTRIAL LUBRICATION

Helps make machines produce more at lower cost

First Cost or Final Cost?

There are bearing bronzes which are cheaper than Bunting's, if you are interested only in first cost or purchase price. But if, as we believe, your interest is in ultimate cost—then you will buy Bunting.

Bunting Bearing Bronze is made to standards of quality maintained and improved through the years. Cast in a foundry where the temperature and analysis of each ladle is checked and controlled, machined on most modern equipment, inspected for conformity to dimensions, structure and finish, Bunting Bronze Bearings and Bars cost less ultimately because your scrap loss is virtually zero. The Bunting Brass & Bronze Co., Toledo 9, Ohio—Branches in Principal Cities.

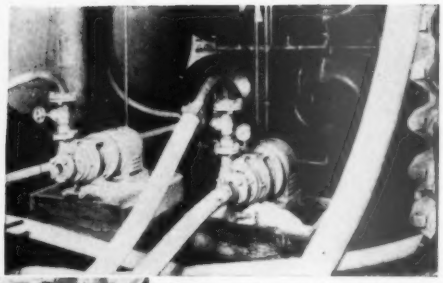
Bunting

BUSHINGS

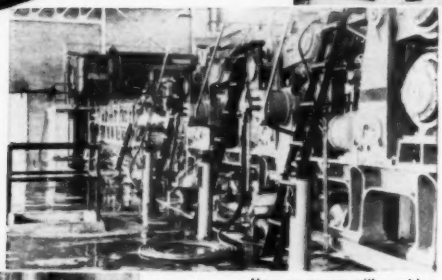
PRECISION BRONZE BARS

BRONZE BEARINGS

Distributor *Praises*
MANHATTAN
Hose Engineering

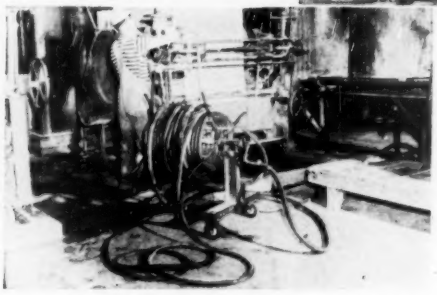


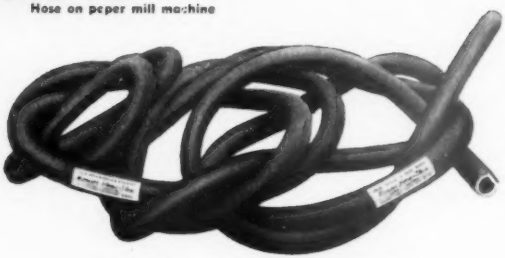
Hose on stationary carbonating pumps



Hose on paper mill machine

Hose for cleaning by air





Condor HOMO-FLEX Hose "Flexible as a Rope"

"Maybe your hose problem's not so tough, maybe tougher . . ."

". . . But whatever it is, chances are that Raybestos-Manhattan has a hose to solve it." This is the testimonial of the Lewis Supply Company, Memphis, Tenn.

One of their customers was having trouble handling anhydrous ammonia. Ice formed in the hose, which caused the hose to become brittle and to crack. Lewis Supply turned the problem over to Manhattan research men. They quickly developed a special "anhydrous ammonia hose".

This, of course, enabled this Raybestos-Manhattan distributor to render outstanding service to the customer. It's a story that has been repeated many times with many hose problems. Manhattan engineers have developed no less than 63 different types of hose, each for a specialized purpose.

Famous among Manhattan's standard constructions are CONDOR, for heavy duty jobs from sand blasting to dredging . . . and HOMO-FLEX, the easy-to-handle hose for air, water, suction, paint spray, etc. Newest development is RAY-MAN, made with rayon cord for extra light weight and flexibility on small air tools.

Many troublesome maintenance and equipment operating problems are eliminated when you make Manhattan your choice.

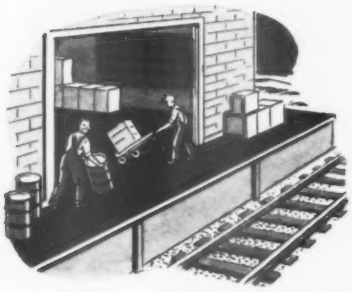
Keep Ahead With Manhattan

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose • Fan Belts • Brake Linings • Brake Blocks • Clutch Facings • Packings • Asbestos Textiles • Powdered Metal Products • Abrasive & Diamond Wheels • Bowling Balls

How You Can S-T-R-E-T-C-H YOUR FLOORING BUDGET...



Increase Service Life and Cut Maintenance Costs with Flintkote Flooring Products

Wherever you need a heavy duty utility floor, specify industrial asphalt mastic floors made with **FLINTKOTE FLOORING EMULSIONS.** Here are a few of the many advantages of this rugged, economical flooring:

You can lay it quickly and easily over almost any clean, firm base . . . new or old. It's quiet and resilient . . . comfortable to walk and work on. Mastic floors have high traction value, wet or dry. They can withstand heavy point loads, without indenting . . . or moving loads without shattering . . . and heal themselves of minor scars and cuts.

FLINTDEK will help keep you on a firm footing. Where slippery floors are a hazard, this anti-slip coating cuts risk and increases floor life. It has important qualities of resistance to fire, shock, gasoline, oil, water and weather. Flintdek is ideal for application by trowel in thin coats over almost any surface. Use it on slippery ramps, around machinery, on steps and ladder treads, on steel decks, in shower rooms and the like. Several attractive colors are available.

In offices and other areas using decorative flooring, particularly over a wood base where flexibility is essential, insure satisfactory results with **FLINTKOTE PERMAKOTE UNDERLAYMENT.** This lightweight mastic mix with a neoprene binder is especially designed for above grade floors . . . wood, concrete or steel. You get greatly increased resilience. And the sound-damping, shock-absorbing qualities of Permakote increase efficiency of personnel . . . add to service life of floors.

Be sure you choose the proper adhesive for fastening asphalt tile, wood block or other types of unit flooring to prepared bases. Oftentimes special conditions call for special cements. The Flintkote Company produces a full line of **TILE CEMENTS** . . . with special formulae to meet above and below grade conditions, and other requirements.

FLINTKOTE INDUSTRIAL FLOORING PRODUCTS

- Mastic Flooring Emulsions
- Premix Patching Mastic
- Anti-Slip Flintdek
- Permakote Underlayment
- Floor Sealers
- Tile Cements

And there are other Flintkote Flooring Products to help you stretch your flooring budget. Premix Mastic, ready mixed, ready to use for patching holes and breaks in concrete floors . . . Flintseal®, the hot-poured, rubber-asphalt compound for positive sealing of joints and cracks against water-infiltration.

Get complete information and specifications on these and other Flintkote Flooring Products. Write, today, to The Flintkote Company, Industrial Products Division, 30 Rockefeller Plaza, New York 20, N.Y.

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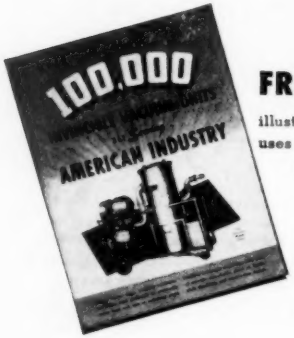
bolts
broken glass
carbon black
chemicals
coal dust
coffee
cotter pins
core sand
cork
crushed stone
dirt
explosives
fabricated parts
fertilizer
flour
fly ash
fly lint
frit
gold
grains
grindings
lead
liquids
metal dusts
nuts
paper dust
plastics
powder
oils
ravelings
rivets
sand
sawdust
silica dust
soap
shot
silver
soapstone
soot
spices
starch
sugar
talc
water

These are only some of the materials successfully handled by Invincibles—by recovering or reclaiming almost anything that will pass through a vacuum hose, they quickly repay their costs... Invincibles also serve as vacuum cleaners, keeping plants clean, safe and more productive by removing all industrial dust and dirt... Over 100,000 Invincibles are in use—5,000 for over 25 years. Let Invincible engineers apply their more than 40 years of experience to your reclaiming or cleaning problem.



FREE BOOKLET

illustrates valuable industrial uses of Invincible Vacuum Units. *Ask for it!*

Model 809-B—an extra-heavy duty unit (5 HP). Other models from ½ HP up.

INVINCIBLE VACUUM CLEANER MFG. CO.
DOVER, OHIO

FOR 40 YEARS, LEADERS IN INDUSTRIAL VACUUM EQUIPMENT

Multi-Purpose P&H STAINLESS STEEL Electrodes

Make Difficult Welding Jobs Easier and Cheaper

Use them for welding all types of stainless steel, dissimilar metals, armorplate, cast iron, manganese ...and for corrosion resistance

There's a P&H electrode for every kind of stainless steel — an electrode that properly matches the alloy elements of the stainless you're using. That's why P&H stainless Steel electrodes give such good results.

And you can count on these electrodes to do much more than just a good welding job. They are multi-purpose — check this listing and see why it pays to have P&H stainless-steel electrodes on hand:

AW3-C — for welding air-hardenable, high-strength alloy steels where a tough, strong, ductile weld is needed. Also for armorplate, high carbon, high manganese and type 301 stainless steels.

Harstain 18-8 — for fabrication of chemical, oil refinery, and food-processing equipment made from 301, 302, 304, 305, 306, and 308 stainless. Gives good color match.

Harstain 18-8 Cb — for dairy, chemical, and other corrosion-resisting equipment made from 321 and 347 stainless. Permits control of carbide precipitation. Columbian stabilized.

Harstain 18-8-2 Mo — for equipment requiring maximum resistance to sulphite, sulphurous acid liquors, pickling solutions, and bleaches.

Harstain 18-8-3 Mo — ideal for welding types 316 and 317 stainless steels.

Harstain 25-12 — for type 309 stainless-clad steels. Has high strength and resists oxidation at high temperatures.

Harstain 25-20 — for use when annealing after welding is not practical; also for high-strength, ductile welds on high-carbon and alloy steels, cast iron, and joining dissimilar carbon-content steels.

Harchrome 5 Cr — resists oxidation up to 1200 degrees F.

Harchrome 16 Cr — the weld metal of this electrode has high strength and resists corrosion and oxidation up to 1550 degrees F.

Get a supply of these extremely useful electrodes from your P&H representative. Write us for latest literature.

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HARNISCHFEGER CORPORATION

TO CUT ASSEMBLY COSTS...
fit the fastener *to the job*

IT CAN BE costly to assume that the presence of metal *assures* a means of good fastening. The screw designed and built for sheet metal .050″ to .200″ thick is not the most efficient fastener for sheets or plates over .200″ thick.

To avoid fastening failure, to prevent assembly stoppage . . . to hold production costs to the minimum, *fit the fastener to the job.*

Parker-Kalon alone offers a complete line of Self-tapping Screws (the most economical fastener) for every metal and plastic assembly. P-K Assembly Engineers thus can recommend, without bias, the type of fastener that best serves the application. That's why . . .

more Fastening-wise Manufacturers call on Parker-Kalon

Look at all these other advantages . . .

MORE Know-How — Parker-Kalon originated the Self-tapping Screw and has been the leader with new designs ever since.

MORE "Show How" — P-K's staff of Assembly Engineers has helped solve nearly a million application problems.

MORE Exacting Quality Control — P-K's investment in laboratory testing and inspecting equipment is unsurpassed.

MORE Production — Parker-Kalon is the world's leading manufacturer of Self-tapping Screws.

MORE Top-Rated Distributors — Everywhere throughout the nation P-K Self-tapping Screws are readily available.

PROMPT DELIVERIES from stock on most types and sizes.

LET A P-K ASSEMBLY ENGINEER HELP YOU simplify your product's assembly and avoid unnecessary production costs by fitting the fastener to the application. Often, he can save you the necessity, and expense, of using special fasteners. If you prefer, mail assembly details for recommendations. Parker-Kalon Corporation, 200 Varick St., New York 14, N. Y.

REMEMBER . . . IF IT'S *P-K* . . . IT'S *O.K.!*

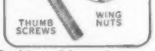
P-K®

The Original

PARKER-KALON SELF-TAPPING SCREWS

FOR EVERY METAL AND PLASTIC ASSEMBLY

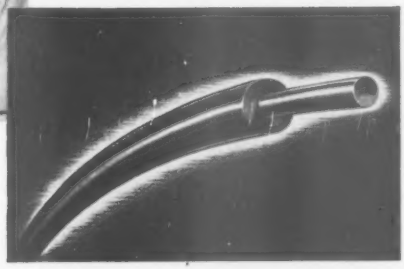
P-K Also Makes Cold-forged



OTHER P-K PRODUCTS: Cold-Forged Socket Screws, Wing Nuts, Thumb Screws • Hardened Screwnails and Masonry Nails • Shur-Grip File and Solder Iron Handles • Metal Punches • Damper Regulators and Accessories

For rewiring that pays its way

Flamenol Building Wire



Pays today

For rewiring that really pays its way in installation speed and savings on space—you just can't beat General Electric Flamenol® Type TW building wires.

The thermoplastic insulation on G-E Flamenol wires cuts clean, strips off easily. For quick installation, Flamenol wires are wax-coated, to slide easily through raceways. For speed on the job, Flamenol wires are light in weight—easy to handle.

For more current in existing raceways, General Electric Flamenol wires make use of the maximum permissible conduit area. Small-diameter insulation lets you pull through more wires per raceway.

Look to General Electric Flamenol wires for rewiring that really pays its way on the job. For more information, write to Section W34-834, Construction Materials Department, General Electric Company, Bridgeport 2, Connecticut.

Pays in the years to come

Because this thermoplastic was developed expressly as an electrical insulating material, G-E Flamenol building wires are made to last. Flamenol insulation will keep its smooth surface and maintain its high dielectric strength indefinitely.

These wires also resist the effects of air, acids, alkalies, water, grease, and oil—will not support combustion. A variety of colors makes circuit tracing easy.

. . . from the complete line of G-E wires and cables—

INDUSTRIAL

Flamenol cable • Flamenol building wire • interlocked-armor cable • Coronol® and Versatol®-geoprene cables • varnished cambric cable • aerial cable • Deltabeston® asbestos and varnished cambric cable • portable cable • boiler room wire • portable cord • parkway cable.

COMMERCIAL and INSTITUTIONAL

Flamenol building wire • leaded building wire • Portable cords • Deltabeston power cable • remote-control system wire • boiler room wire.

RESIDENTIAL

PVX® and BraidX® nonmetallic-sheathed cables • BX® armored cable • service entrance cable • remote control system wire.

SPECIALIZED INDUSTRIES

mine cables • railway signal wire and line wire • control cable • portable cord and cable • locomotive cables and cab cords.

UTILITY

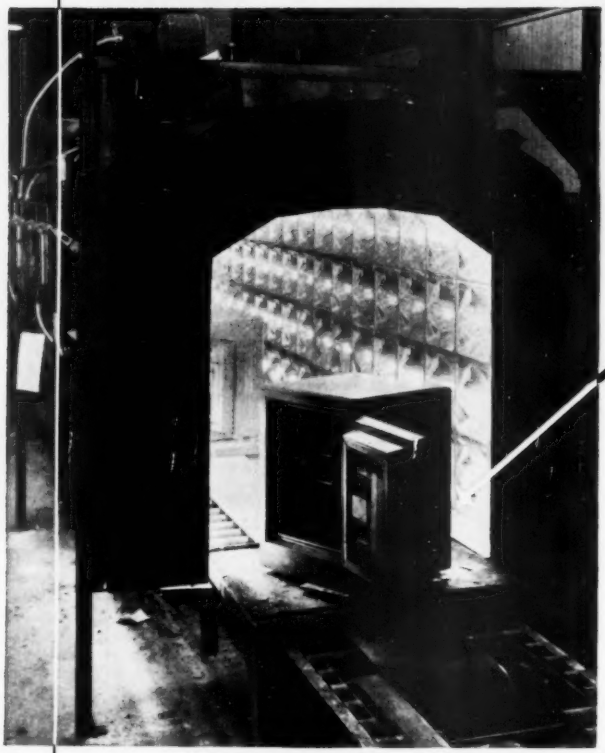
solid paper-insulated cable • gas-filled cable • oil-filled cable • pipe cable • varnished cambric cable • Coronol- and Versatol-geoprene cables • aerial cable • Flamenol wire and cable • asbestos and varnished cambric cable • boiler room wire.

GENERAL ELECTRIC

THROUGHOUT INDUSTRY–IT'S FOSTORIA EVENRAY

HIGHEST EFFICIENCY IN

INFRA-RED EQUIPMENT



A TYPICAL FOSTORIA EVENRAY OVEN INSTALLATION — This Fostoria Evenray System at Herring-Hall-Marvin Safe Co., Hamilton, Ohio, bakes enamel on various sizes of safes in 12 to 15 minutes. Lacquer is forced dried on some safes in the same oven in 6 minutes.

SAVES
TIME • SPACE • COST
FOR FINISH
BAKING
and Many Heating
Operations

Properly engineered, Infra-red is the most efficient of all heating systems for finish baking and many other heating operations. Fostoria Evenray Systems out-perform any other Infra-red equipment on the market today. The experience of over 6,000 installations — the outstanding ability and leadership of Fostoria Infra-red engineers — the foremost research and knowledge of Infra-red applications — are combined in Fostoria Evenray Systems. It pays to use Infra-red — and Infra-red pays *best* with the sound engineering of a Fostoria Evenray System. Request a Fostoria recommendation, today.

WRITE
today, for free brochure describing the Infra-red process and Evenray advantages. Tell us your particular problem for our recommendation. No obligation.

EVENRAY SYSTEM
fostoria
FOR BAKING • DRYING •
PREHEATING • DEHYDRATING

THE FOSTORIA PRESSED STEEL CORPORATION
FOSTORIA, OHIO

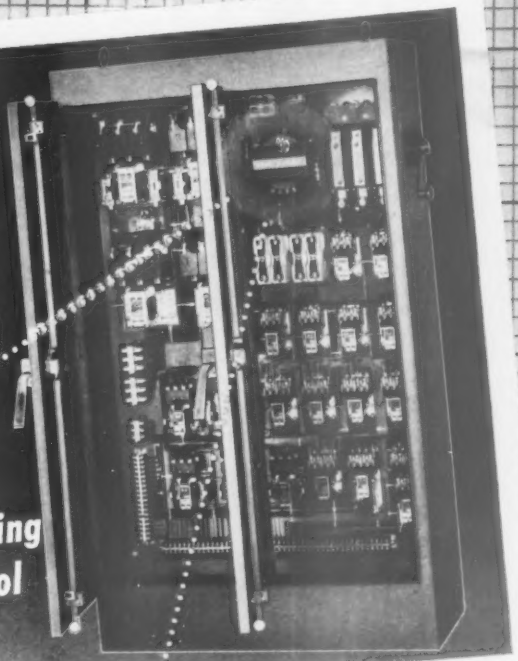
Oldest and Largest Manufacturers of Industrial Infra-red Ovens

EXPERIENCE COUNTS—

Over 6,000 Plants Now Bake And Dry With Fostoria Evenray Systems

- Lowest Unit Operating Cost
- Most Uniform Coverage
- Maximum Temperature Range
- Maximum Energy Utilization
- Greatest Flexibility
- Approved Electrical Construction — Listed under Re-examination Service of Underwriters' Laboratories, Inc.

DESIGN LEADERSHIP

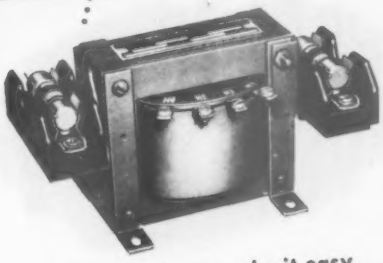


Another good reason for selecting Square D Machine Tool Control

Square D's line of machine tool control is an ever-growing line—keeping pace with the expanding requirements of the machine tool industry. That's why practically any performance requirement can be met with a combination of standard Square D devices, every one of which is designed specifically for machine tool applications.

New Control Transformers a good example of Design Leadership

Rapidly growing demand for the low voltage safety element in motor control circuits has focused attention on the need for a transformer designed to supply A. C. magnetic starters, contactors and solenoids typical of such systems. Square D's new line of transformers meet that need—exactly.



These features make it easy to meet Low Voltage Requirements

Lower Voltage Drop—unusually low impedance gives good regulation. Designed to handle the high inrush currents typical of A.C. magnets.

Secondary Circuit Protection—provided by easily adding Square D bracket and fuse block unit-assembly. One or two can be added to any of the transformer sizes—maximum flexibility with minimum stocking.

Dual-Voltage Primary—(*optional*) primary winding reconnectable for either 220 or 440 volts—required by "Automotive Standards."

Write for Bulletin 215...Square D Company, 4041 N. Richards St., Milwaukee 12, Wis.

SQUARE D COMPANY

DETROIT • MILWAUKEE • LOS ANGELES

SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

ANNOUNCING THE NEW UDYLITE LUCITE PLATING CYLINDER

- **UP TO 180°F. UNDER LOAD!**
- **30% INCREASE IN PERFORATED AREA!**
- **"DEEP-DIP" DESIGN!**
- **OPERATES THROUGH COMPLETE CYCLE! (Acid or Alkaline)**

Rigorously Tested Under All Conditions In The Industry's Finest Testing Laboratories

We've really put this new cylinder through the paces—subjected it to operating temperatures of 180° F. *UNDER LOAD*—heaped it full of odd-shaped parts for abrasion tests—made it PROVE it's fit to take its place with the other top-quality Udylite equipment the industry knows so well. *And now it's ready for you.*

Notice these important features: Door clamps are designed to give maximum support to the door panel, yet open easily. Door openings are machined all around to insure positive fit. The shell is grooved and cemented into the cylinder heads. Over-size superstructure—"Deep-Dip" design—lets the cylinder hang deep in the tank. We've given it 30% more perforated area than conventional cylinders—and a full 14″ *inside* diameter—for faster plating and greater capacity.

Ask your local Udylite Technical Man for further details without delay—or write us direct:

PIONEER OF
A BETTER WAY
IN PLATING

THE
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move fast...save fast!

Production is material in *motion*, but *commotion* rules in many plants because handling practices have not kept pace with processing efficiency. That's why fully 30% of every manufacturing dollar is still spent to lift and move materials.

With selling prices on the decline, it's time to cut costs where you can cut the most: *in material handling!* How? Put Yale Material Handling Machinery to work saving time and effort, stepping up handling efficiency, injecting new economy and safety into every receiving, processing, weighing, warehousing and shipping operation.

Yale Hand and Electric Hoists, Hand Lift and Power Trucks and Scales are built in types and capacities for every need in every industry. Results prove that Yale equipment moves *fast*, saves *fast*. It can do the same for you. Let us check your handling routine and recommend ways to give you the economy you want. Phone our nearby representative or write direct.

YALE
TOOLS THAT KEEP INDUSTRY "ON THE MOVE"

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Here is Plain PROOF...

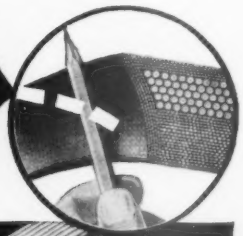
You can actually *feel* the sides of a belt *change shape* as the belt bends.

That the

CONCAVE SIDE

(U. S. Patent No. 1813698)

SAVES Transmission DOLLARS



The Mark of SPECIALIZED Research

When a *straight-sided* V-Belt bends around a pulley, three things are bound to happen.

(1) The top of the belt, being under tension, *narrows.* (2) The body of the belt, under compression, *widens.* (3) The sides of the belt *bulge out.*

These *shape changes* are inevitable. They are shown in figures 1 and 1-A, below.

Straight-Sided V-Belt.

How Straight-Sided V-Belt Bulges In Sheave-Groove.

Because this bulging belt does not fit the sheave groove, two facts become clear. (1) The belt will get excessive wear where it bulges—*shorter life!* (2) The whole side of the belt cannot *uniformly* grip the pulley—*a loss in drive efficiency.*

How different the V-Belt with the precisely engineered *concave* side (U.S. Patent No. 1813698)—the Gates Vulco Rope. As this belt bends it assumes a shape that *exactly* fits the sheave groove. (Figures 2 and 2-A, below.)

Gates Vulco Rope with Concave Side.

No Side Bulge. Precise Fit In Sheave-Groove.

Two savings result. (1) The Gates Vulco Rope wears evenly—*longer life!* It's entire side-wall grips the pulley—no slip—*full delivery of power!*

The Concave Side is MORE IMPORTANT NOW Than Ever Before

Because the sides of a V-Belt are what actually drive the pulley it is clear that any increased load on the belt means a heavier load that must be transmitted to the pulley directly through the belt's sidewalls.

Now that Gates *SPECIALIZED* Research has made available to you SUPER Vulco Ropes—carrying fully 40% higher horsepower ratings—the life-prolonging Concave Side is naturally more important in conserving belt life today than ever before.

498

GATES VULCO ROPE DRIVES

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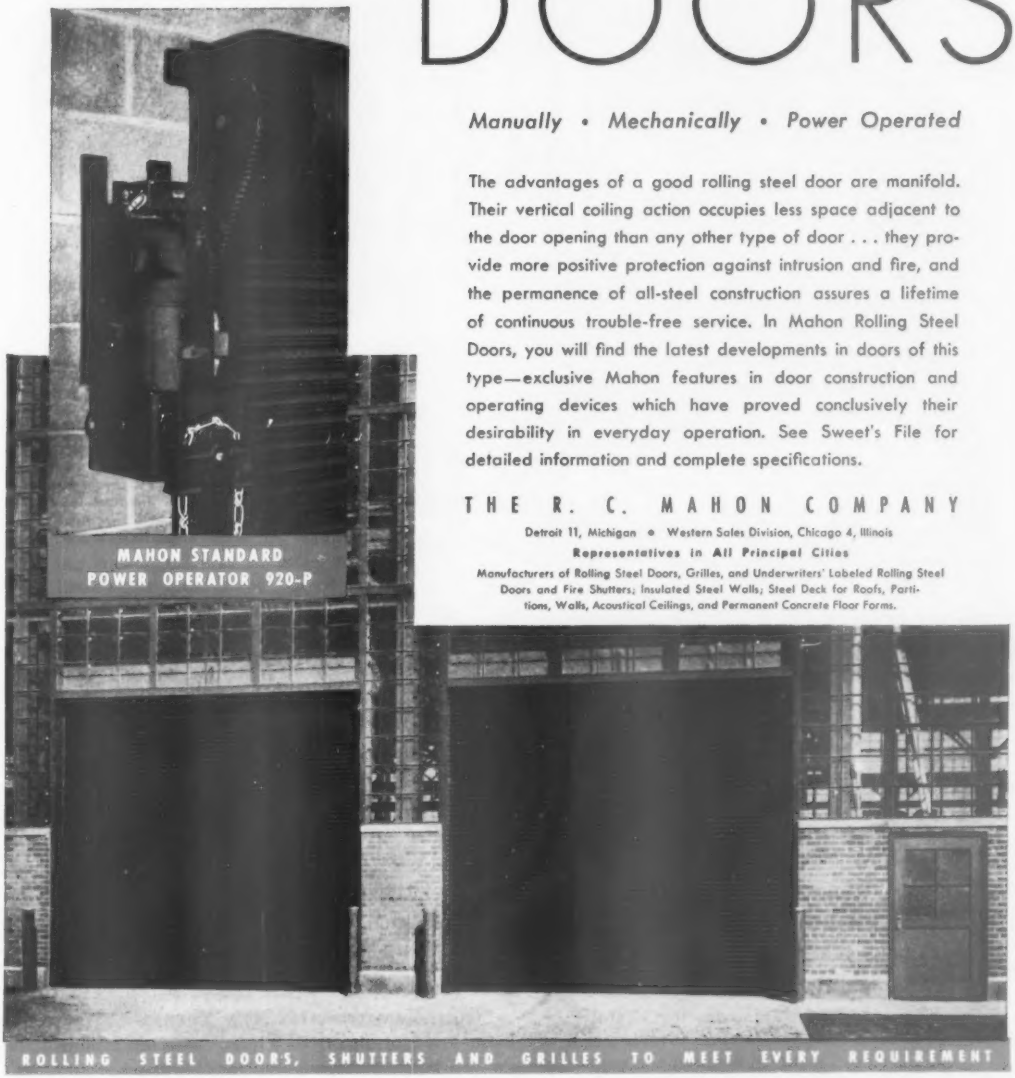
Manually • Mechanically • Power Operated

The advantages of a good rolling steel door are manifold. Their vertical coiling action occupies less space adjacent to the door opening than any other type of door . . . they provide more positive protection against intrusion and fire, and the permanence of all-steel construction assures a lifetime of continuous trouble-free service. In Mahon Rolling Steel Doors, you will find the latest developments in doors of this type—exclusive Mahon features in door construction and operating devices which have proved conclusively their desirability in everyday operation. See Sweet's File for detailed information and complete specifications.



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Texaco Lubricants are *definitely preferred* in many fields. In aviation, for example—

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FACTORY
MANAGEMENT AND MAINTENANCE

Management and the Plant's Labor Hours

EXCEPT IN TIMES of national emergency, it is management's job to seek always for lower cost of production. Lower cost of production means higher plant efficiency.

A customary procedure is to measure plant efficiency in output per man-hour of work. So it becomes pertinent for management to ask itself, "What shall I do with the hours of labor at my disposal?"

An obvious answer is, "Concentrate on securing equipment and adopting methods that will insure the greatest output of product for each hour of labor." In the main, that is *the* answer. But it is not successfully applied without finding the answers to a lot of other questions.

As one example, there is the problem of planning for technological displacements. Every betterment program shows how the total number of labor hours consumed in the plant can be reduced. What about jobs for the surplus workers?

As another example, consider human relations in general. Because of the intricacies of the relationship of human attitudes toward equipment and methods, an integrated cost-reduction program is required. It must begin, of course, with the assignment of the plant people to their proper roles. Who is supposed to do what? Has he the authority as well as the responsibility?

Understanding must be brought about. Why should the plant people cooperate to lower production costs? What will it mean to them? How are they to go about it?

Labor hours are at the disposal of workers as well as management. It's a broad-minded worker who will understand why more must be produced per hour while at the same time the number of hours used must be reduced. The whole system of employee communications may have to be remade, or one may have to be created.

It is clear that management has the responsibility for deciding what it will do with the plant's labor hours. But it is equally clear that management has the responsibility for helping the workers decide what they will do with the same labor hours.

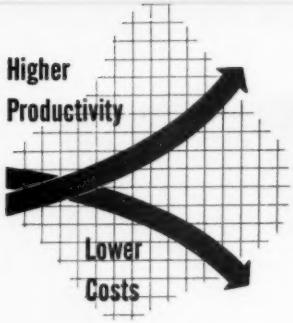
If Management and Labor Work Together

It is quite within the realm of possibility that management and workers will see eye to eye. If they do, they will work cooperatively toward these objectives:

1. Effectively using the most productive equipment.
2. Adopting the most efficient manufacturing methods.
3. Eliminating waste of all kinds (materials, man-time, machine-time).
4. Lessening manual labor by transferring as much work as possible to machines.
5. Relating wage payment to production.
6. Acting in all particulars to bring about low production costs that will permit the sale of their products in a keenly competitive market.

It is a worth-while accomplishment that faces management if it can find the right things to do with the labor hours at its disposal.

THE FOURTH



ARTICLE IN FACTORY'S

Make Fullest Use of

1 · **REPLACE** obsolescent electrical equipment and systems

2 · **KEEP** the electrical systems and equipment in good condition

3 · **MAKE SURE** that the equipment is suited to the application

4 · **DON'T** let unfavorable electrical conditions develop

5 · **USE** every electrical aid to low-cost production

G. A. VAN BRUNT • ASSOCIATE EDITOR, FACTORY

WIDESPREAD USE OF ELECTRICAL ENERGY and electrical equipment does not necessarily mean that a plant is using either to the best advantage, or with maximum efficiency. These conditions do not come about automatically. They are achieved only by a close study of many different factors. Also, there is nothing static about these conditions. When once achieved they do not automatically maintain themselves.

There are two reasons for this situation: (1) New electrical apparatus is being developed all the time, while improvements are continuously being made in existing equipment; (2) conditions in practically all plants are continuously changing. Processes change, new products are developed, new production machines are installed, electrical loads change.

These circumstances make frequent reappraisal of the entire electrical system and its associated equipment necessary if maximum effective use of this service is to be maintained.

Any one or more of several different situations may effectively prevent a plant from cashing in on the cost savings and other advantages that follow the most effective use of electrical services and equipment. However, observance of the following principles in the application and use of equipment will prevent these situations from arising.

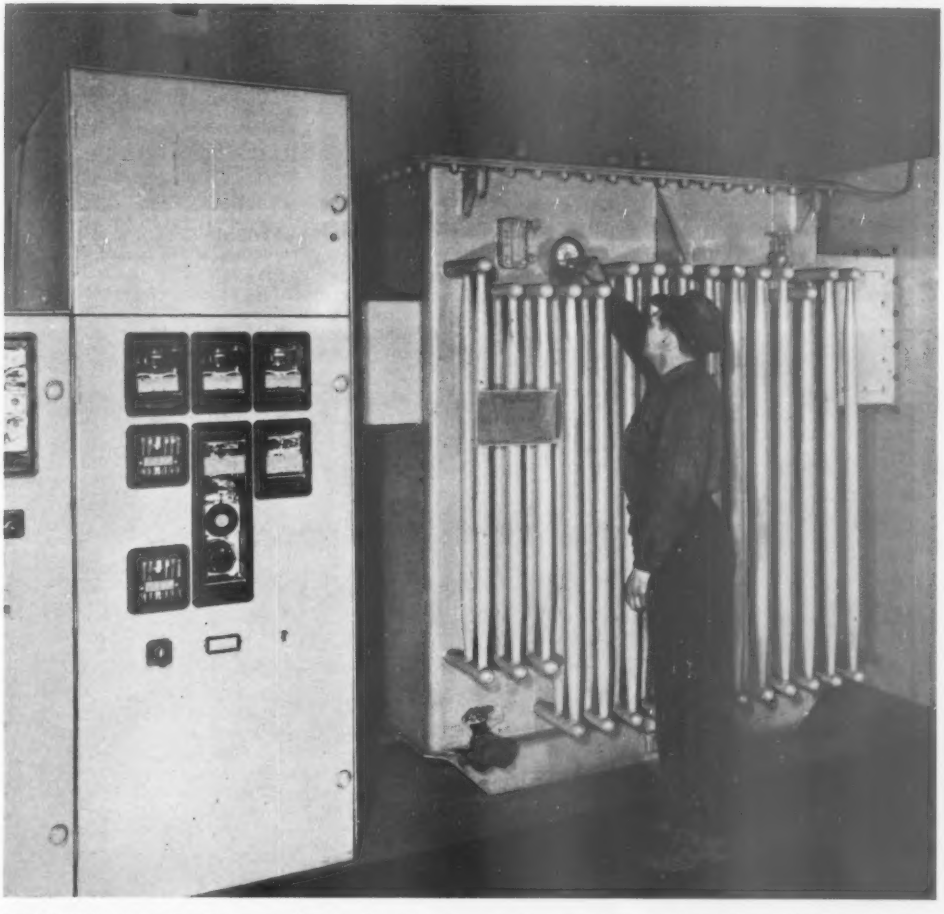
1 · Replace Obsolescent Electrical Equipment

Obsolescence is an insidious condition that takes various forms, but the end-result is the same in all instances. Sometimes rapidly, sometimes slowly, equipment reaches the point where it cannot meet the demands put on it, or it cannot perform its functions as efficiently or reliably as later apparatus.

At least two factors are involved in this process. First and most important, new materials, greater knowledge, and more experience make possible a continuous flow of new designs that are better than previous equipment. Second, over the years natural wear and tear take a serious toll of every type of equipment. Efficiency and reliability tend to drop. Maintenance and repair costs go up.

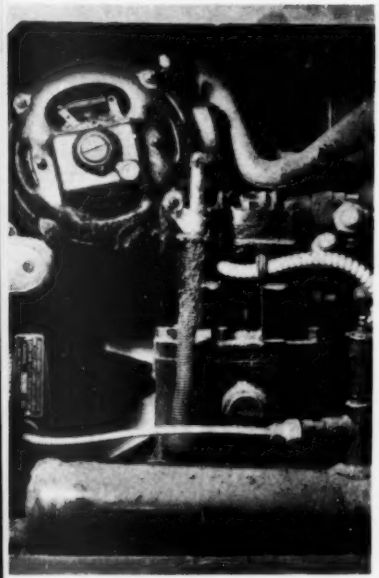
With motors, for example, the insulation becomes brittle and bearings wear. Both coils and bearings can be replaced, of course, but even when an old motor is rebuilt, it is still an old motor. The same situation applies broadly to all types of equipment. The dimensions do not follow today's standards. That feature

Electrical Equipment

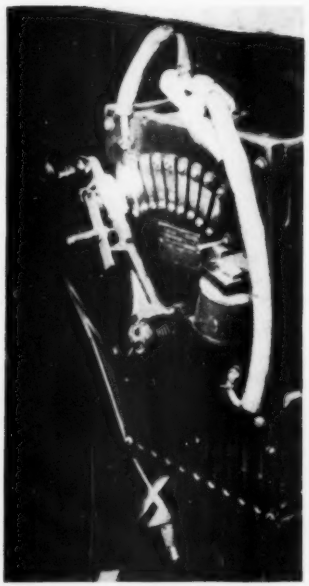


OBSOLETE steam-electric generating equipment at Vinton Coal & Coke Company, Vintondale, Pa., was replaced three years ago by an ignitron rectifier which operates on power purchased from a local utility. Result: Cost of power per ton of coal has been reduced from 37½ to 23 cents, resulting in substantial savings

POOR MAINTENANCE...



DIRTY motor collects lint, which can clog vents or get oil-soaked



WORN contacts may result in the formation of dangerous arcs

EXPOSED cable, due to faulty installation, is fire hazard

...MAY CAUSE DISASTERS

FIRE followed fusing of oil switch contacts caused by worn collar

EXPLOSION of oil switch had enough force to blow out part of a brick wall, and ruined equipment that was expensive to replace

alone may cause some trouble when changes in location become necessary.

Old starters may lack the protective and other features that characterize today's designs. Old switchboards with exposed wiring and current-carrying parts may be a serious fire and injury hazard. Chances are they were designed for lower voltages than are now commonly used. Also, the switching facilities provided may be quite inadequate in the light of present-day requirements.

Circuit breakers may not only be of inferior design, but they may also lack sufficient interrupting capacity to protect equipment and circuits in the event of a serious fault.

Growth of a plant, with increases in load and extension of the areas to be served, may render an existing distribution system obsolete within a few years. Long low-voltage lines are breeders of high voltage drop and high losses. Also, the layout may be such that trouble anywhere will put a large number of machines out of service. That possibility is something that should be corrected.

Finally, the construction of the distribution system may be such that adding machines or changing their location involves costly wiring. When changes in machine location are frequent or extensive, the cost of these changes under such conditions may be definitely burdensome.

2 · Keep Electrical Equipment in Good Condition

Poor condition of the equipment may be due to such causes as abuse, overloading, severe operating conditions, lack of proper maintenance, or a combination of all these factors. Whatever the immediate cause, the effects are certain to be costly. Reliability, for example, is likely to be a very uncertain quantity. With today's high wage, material, and production equipment costs, frequent or extended interruptions become too expensive to be tolerated.

Nor are costs and inconvenience of interruptions the only hazards to low production costs presented by electrical equipment that is in poor condition. All too often defective insulation suddenly breaks down and starts a fire that may be disastrous.

Aside from the hazards it poses to plant personnel, electrical equipment that is in poor condition inevitably incurs high maintenance and repair costs to keep it going.

3 · Make Sure Equipment Is Suited to Application

Misapplications of electrical equipment are not uncommon. They may come about in several ways. For example, when the installation was originally made, there may have been failure for some reason to select the type of motor, control, or what not, that was best may have been made in the operating requirements.

Some time after installation, important changes may have been made in the operating requirements. That is, speeds or loads, operating cycles, atmospheric conditions, or other factors may have been changed so radically that equipment which was originally well suited to the service is now a misfit.

The third way in which misapplications may come about is when a spare motor, say, is substituted for the original after it has failed or been taken out of service for some reason.

Whatever the reason for misapplication of any equipment, the result is almost certain to be unnecessary trouble and expense. Such conditions should not be tolerated.

4 · Do Not Let Unfavorable Conditions Develop

A number of conditions that may be present in, or that affect, the electrical system of a plant will be reflected in higher costs, lower efficiency of equipment, or trouble of various kinds.

Low Power Factor

Low power factor is one of the most common ailments of plant electrical systems. The chances are that any plant in which this condition does not exist in serious degree has corrected it.

Power factor concerns only alternating current systems. It does not exist in direct current systems.

When current is applied to alternating current motors, transformers, or other apparatus that requires a magnetic field, part of the current does useful work, as when the motor drives a machine. The remainder of the current, neglecting losses, is used up in creating the magnetic field. This field is magnetized in one direction, then demagnetized and magnetized in the opposite direction, and again demagnetized during each cycle. Thus with 60-cycle current this process of setting up a field takes place 60 times a second.

A comparatively large amount of energy is required for the alternate magnetization and demagnetization. It is supplied by the generator during one part of the cycle and then returned to the generator during another part. This action results in a continuous surge of current back and forth between the current-consuming apparatus and the power station. No useful work is done by this circulating current, since it is merely borrowed and returned during each cycle. Nevertheless it ties up generator, transformer, and line capacity, heats them, and causes losses in them just the same as the useful or working current. Hence it should be kept as low as is feasible.

The power factor, then, is the ratio of the true watts or the component of the current that does useful work, to the apparent watts or total current drawn by the equipment. It may be expressed as a percentage, or as a decimal figure. In either event it represents the number by which the apparent power must be multiplied in order to obtain the real or true

power. Obviously, the higher the power factor, the lower the value of the circulating or wattless current. Power factor cannot, of course, be more than 100 per cent. That value represents the best operating conditions, so far as power factor is concerned.

A power factor of 90 to 95 per cent is considered good and usually little attempt is made to go above that figure. On the other hand, when power factor drops to 60 per cent it usually creates serious trouble, and requires correction.

There are several ways in which low power factor is expensive and bothersome. It can, for example, raise the power bills considerably. Utility companies usually penalize customers when power factor is below 80 or 85 per cent, and may pay a bonus if it goes above 90 per cent.

Since the circulating currents associated with low power factor tie up distribution line capacity, the result may be overloading of these lines. Voltage drops and line losses are increased. Under lower-than-normal voltage, motors tend to run hotter and slower. Electrically heated devices come up to the desired temperature more slowly. In fact, some difficulty may be experienced in maintaining the proper temperature. Lamps give out less light. Other electrical equipment suffers in various other ways that tend to cause trouble and raise costs.

Since induction motors, particularly when they are underloaded, are the most important cause of low power factor in plants, the use of synchronous motors whenever possible is one method of correction that is commonly used. These motors operate either at unity or at a leading power factor, in which case they help to correct the low power factor of induction motors or other equipment.

Proper loading of induction motors is an important matter that should be watched. Full-load power factor of induction motors varies somewhat with their rating and speed, but in general it ranges from about 85 to 92 per cent. It tends to fall off rather rapidly as the load decreases below the rating of the motor, whereas it remains approximately constant or rises slightly under moderate overloads.

As a rule, however, it is necessary to install capacitors, which are also referred to as static condensers, to bring the power factor up to an acceptable value. In effect, capacitors have a leading power factor which can be used to offset the lagging power factor of motors, transformers, and other types of equipment that require a magnetic field.

Depending on conditions, capacitors may be connected to raise the power factor on main feeders or branch circuits. Or they may be installed at individual motors or other equipment. In such instances the capacitor is switched on and off with the equipment. Otherwise, it usually is necessary to make provision for cutting the capacitor banks in or out of the circuit either manually or automatically as load conditions vary.

High Demand Peaks

An unnecessarily high demand is another condition that often increases power bills.

The demand charge in a power bill represents the fixed cost of the utility for doing business and the investment charges on the generating, transmission, and other equipment needed to maintain the capacity required by the customer 24 hours a day. Assuming a certain capacity in kilowatts required by a plant, the relation of the fixed (or demand) charge will be greater or less, depending on the use made of the capacity reserved for its use. High maximum demands increase power bills. A plant that uses large amounts of energy for short periods costs more to serve and must pay more than one that has a relatively steady load for long periods, even though the total energy that is consumed may be the same in both instances.

High demand peaks usually are caused by starting a number of motors within a short period, or by simultaneous operation of two or more machines, or other equipment that draws heavy currents.

Aside from the part they play in increasing power bills, high demand peaks tend to cause objectionable dips in voltage, which are reflected in lower output from the lighting system, and in reduced speed or possible stalling of motors. Under-voltage devices may drop out and cause more trouble.

There are, obviously, plenty of good reasons why high peaks should be avoided.

Much can be done to eliminate excessive peaks by scheduling operation of equipment so that unnecessary piling up of the load is avoided. For example, when one or more units of any equipment that imposes a heavy load are operated, other units will be shut down. Also, starting of large motors may be staggered.

If this method of handling the problem is not feasible or desirable, use may be made of a demand limiter. These devices will sound an alarm when the load reaches or approaches a predetermined value, or they will automatically shut down any desired equipment. It is often possible to cut off current to electric ovens or furnaces, or stop large motors driving compressors, say, for short periods of time without interfering with production.

High Voltage Drop

Excessive voltage drop seriously affects the efficiency and operation of all electrical equipment. All such equipment is designed for a certain voltage. If it is operated at a lower voltage, its performance is adversely affected. For example, a 10 per cent drop in voltage reduces the light output of incandescent lamps about 30 per cent. With fluorescent lamps, the drop in light output is somewhat less. The torque of induction motors will be cut to about 81 per cent, while the current draw and heating will be increased. The operation of electrically heated devices also will be adversely affected, as mentioned previously. All these conditions decrease productivity and increase production costs.

Drop in voltage in a conductor is caused by its resistance to the flow of current. In a.c. circuits, reactance also plays a part. Heavy loading of circuits, long runs, and low power factor usually are the prime causes of high voltage drop.

If a plant produces its own power, installation of a generator voltage regulator will do much, perhaps all that is needed, to keep voltage variations within acceptable limits.

Where power factor is low, correction will reduce the circulating current, thereby taking some load off the feeders and transformers, with consequent improvement in voltage conditions. Sometimes that is all that is required.

Other means that may be used for improving voltage conditions depend largely on the cause of the trouble. Thus at least partial relief often can be obtained by boosting the supply voltage on the feeders.

When a distribution system or circuits are overloaded, the voltage usually can be raised by putting in larger feeders, or installing additional circuits and transformers. However, the cost of making such changes may be great enough to warrant serious consideration of an entirely new system that will be better adapted to the requirements; also, more flexible when additions or changes become necessary, and provide reserve capacity adequate for any probable future needs.

That solution of the problem will involve a considerable investment, but it is more than likely to pay good dividends for some time.

A series booster transformer also may be used to minimize the effects of fluctuating loads in producing annoying voltage dips on circuits supplying equipment that requires a steady voltage. These transformers are connected to supply a compensating voltage in tapped lines that supply other loads proportional to the voltage drop brought about by the load that is causing trouble.

Maintenance of practically constant voltage is important on circuits used for operating electronic equipment, calibrating instruments and meters, testing small motors, and similar service. If the voltage of the shop supply varies beyond acceptable limits, use of a voltage regulator should be considered. These devices can be obtained in different ratings, and, under any ordinary conditions, will keep the voltage within about 0.5 per cent of the desired value. That is usually close enough.

Insufficient Protection

Inadequate protective devices are responsible for serious but different kinds of trouble from those mentioned heretofore. Actually an electrical system or electrical equipment will operate without any protective equipment—until some abnormal condition arises. However, if a heavy overload develops or breakdown of insulation allows undirected and unrestrained flow of current, there will be serious trouble aplenty.

Code rules and good practice require that circuits and equipment be protected by devices that will quickly interrupt the current when a dangerous condition develops. If these devices are adequate for the service and in good condition, they will keep damage and delays down to the minimum. Almost anything can happen, however, if they fail to function properly in an emergency.

Circuit breakers are one of the most important devices for protecting circuits and equipment in industrial plants. Their function is to stop current flow almost instantly when a predetermined value is exceeded. If the current flowing is within the interrupting capacity of the breaker, well and good. With a large capacity power supply and a bad fault, the short-circuit current that flows may be more than the circuit breaker can interrupt. Then destruction of the breaker and perhaps other equipment, may easily result, followed by a serious fire.

Disastrous trouble may result also if protective equipment is not in good condition.

Conditions that make such a result possible may come about when the capacity of the supply is increased by the installation of larger generators or by interconnection of generating stations. Circuit breakers that had adequate interrupting capacity before such a change may be seriously deficient in that respect afterward. Unfortunately, unless a careful check is made, that shortcoming will not appear until a serious fault occurs.

Possible remedies for this hazardous condition include installation of breakers with greater interrupting capacity; use of current limiting reactors; or a cascade arrangement of circuit breakers, when conditions are suitable.

Careful study of the conditions will be required to determine the best and most economical solution for these problems.

Fuses also play an important part in protecting electrical equipment and circuits. When these devices are of the proper size and in good condition, they will serve their functions satisfactorily. On the other hand, badly oxidized or corroded fuses can cause much trouble and delay by blowing when conditions are normal. If an attempt is made to remedy that condition by putting in larger fuses, they may not blow when a fault develops, and thus fail to give the protection that is their sole duty.

With some variations in detail the same situation exists with other devices—for example, thermal overload relays for motors—that are designed to prevent damage to electrical equipment. If they are not suitable for the service and in good condition, they are likely to fail to give protection when it is needed. And the results of that failure may be very costly because some abnormal condition or minor mishap or failure is allowed to get out of control.

5 · Use Every Electrical Aid to Low-Cost Production

American inventive genius and engineering skill have been directed for many years towards the development of equipment and devices that are designed to increase production and reduce costs by enabling people to do more and better work with less effort. And, of course, improvement of existing equipment is a procedure that is never ending.

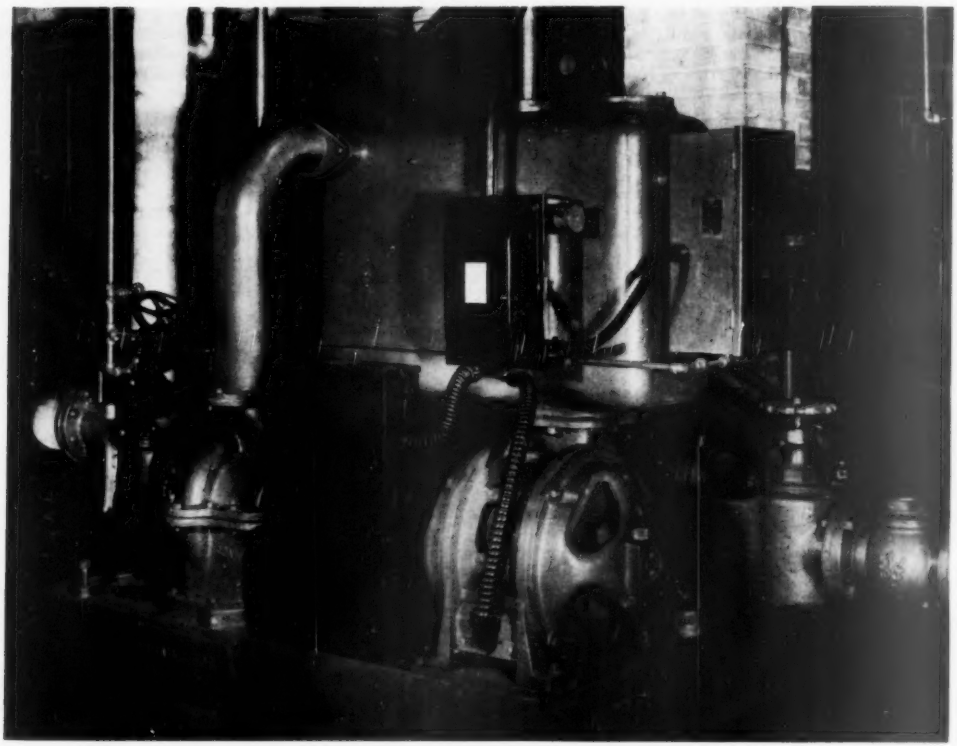
As a result there are available a host of electrical aids, widely diverse in character and function, which are intended to perform some action, service, or function faster, better, and more safely than can be done by humans.

Whether the problem be one of controlling machines, power, or chemical solutions; counting; inspection; communication; heat treatment; warning of dangerous conditions, or whatever—there is available some device or equipment that will provide the solution either completely or in large measure.

In the pages that immediately follow—case examples of the savings or other benefits that various kinds of electrical equipment bring to plants in different industries

Case Studies From 67

Electrical equipment offers endless opportunities to make impressive savings. Ways in which many plants have taken advantage of these opportunities, and what the results were, are told here



THE CAPACITOR CONNECTED TO THIS MOTOR SUPPLIES ITS MAGNETIZING CURRENT, REDUCING THE LOAD ON THE LINE

Capacitors and Synchronous Motors

1 A rapidly expanding machine tool plant found that charges imposed by a power-factor penalty clause in a power contract had increased from approximately $9 to $192 per month in nine months. Remedial measures were necessary.

Power is purchased at 440 volts, three-phase, 60 cycles, and distributed by four circuits through a duct system. Analysis of the power bills showed that at the beginning of the year the demand was 405 kw., and the power factor 78.5 per cent. By September the demand had increased to 633 kw., and power factor had dropped to 60 per cent. The estimated penalty per year for a power factor below 80 per cent would come to $2300.

It was calculated that installation of 390 kva. of capacitors would bring the power factor up to 85 per

cent. The layout of the plant made it desirable to install the capacitors in seven banks, mounted on the ceiling.

Cost of the capacitors, racks, and installation came to approximately $3100, which was $800 more than the penalty for one year's operation without the corrective equipment. At this rate, however, the equipment paid for itself in less than 17 months.

2 A manufacturer of laundry and dry-cleaning equipment found that 420 kvar. of capacitors applied at the end of secondary feeders of a 600-kva. substation raised the power factor from 60 to 95 per cent and resulted in a power bill saving of $150 a month. That is an annual return of about 30 per cent on the investment in capacitors.

This saving was in addition to raising voltage level at the motors and freeing the transformers from a 54 per cent overload.

3 By installing capacitors to raise the power factor from 85 to 95 per cent, a small wire manufacturer saved $2160 annually on his power bills. The 720-kvar. capacitor equipment and breaker were installed in a few hours on the plant's 460-volt bus at a total cost of $6700.

The annual rate of return on this capacitor investment is 32 per cent. In three years the equipment will have paid for itself, after which the power bill saving will be profit.

4 After studying the "two-part rate" power bill and pricing the cost of capacitors, the engineers of Inland Manufacturing Division, General Motors Corporation, Dayton, concluded that a substantial saving on the demand part of the bill could be made by installing capacitors.

Use of 460-volt capacitors was chosen for the following reasons: (1) Cheaper first cost; (2) less danger in handling the lower-voltage equipment; (3) ability to move individual units as future needs dictate; (4) smaller size and less weight; (5) flexibility—more units can be added later if desired.

At present, three units of 540-kva. capacitors will be installed for two reasons:

1. To keep down possible voltage rise, since these units will not be automatically switched off the line. They will be on the line during the week end, when there is a tendency for voltage to rise.

2. To keep well within the space that can be allotted to the equipment.

The operating cost at 3 1/3 watts per kva. is less than 50 cents per day. However, transformer losses, feeder losses in the two lines, and the feeder losses from the main transformer vault when a new primary feed from the local power source is installed will be decreased. Actual balancing of cost cannot be done accurately, but it is estimated that the decrease in feeder losses should just about equal the cost of operation.

An estimate of the total cost installed is:

Price of capacitors	$3,377.25
Labor (mostly electrical)	300.00
Wiring	100.00
Three circuit breakers	615.00
Total	$4,392.25

The estimated saving of $2030 gives a return of 46 per cent a year. Maintenance cost can be neglected under normal conditions. In the future, if more capacitors are considered necessary and overvoltage becomes a problem, it can be overcome with automatic capacitor switches. These switches will operate if the voltage increases more than a given amount during light-load periods such as week ends.

5 Several years ago a large watch company installed capacitor equipment totaling 300 kva. throughout the factory. This was done to reduce the peak load, since the plant operates on a demand basis, and because the power contract requires that a certain power factor be maintained.

This installation of capacitors raised the power factor from approximately 70 per cent to 92 per cent. The investment of $4200 produces a saving of approximately $1500 a year.

6 Capacitors installed by a southern wood working plant required only 18 months to pay for themselves. The total connected plant load of 1412 hp. is made up of 220-volt induction motors. Part of the power required is generated locally.

By installing 26 three-phase 7½-kva. capacitors at individual motors, the power factor was increased from 66 per cent to 88 per cent. This improvement in the system power factor has resulted in a yearly saving of approximately $2000. Initial cost of installation was around $3000.

Through reduction of reactive power, current on the feeders in the plant has been reduced and voltage regulation has been much improved.

7 Application of capacitors on two feeders at a western plant increased the power factor from 55 per cent to 72 per cent and resulted in a saving of $75 a month, or about 4 per cent of the power bill. Total rating of the capacitors now used is 180 kva. Installation of an additional 360 kva. in corrective capacity is contemplated. It would raise the power factor to about 95 per cent, with an estimated saving of about $120 a month more.

Two separate factories are operated on the same premises. Three-phase power is brought in at 66,000 volts and fed to each plant through individual transformers that provide 460 volts for driving the machines.

A bank of three-phase capacitors is connected on the low-voltage side of each transformer to correct the power factor on the entire feeder circuit. The

corrective capacity is thus split equally between two plants. This arrangement made it possible for both to share the resultant advantages.

8 Lee Rubber & Tire Corporation, Conshohocken, Pa., began a study of the plant power factor back about 1926, when it was paying a penalty of approximately $1200 per month. By installing synchronous motors on new equipment that was purchased within a three-year period, it was possible to reduce the power factor penalty to approximately $200 per month. As new equipment had to be installed, a choice had to be made between synchronous and induction motors. In the sizes purchased this meant an increase in the cost of the motors and controls of approximately $1500 each. Four motors were involved, making a total additional equipment cost of $6000. The saving was about $12,000 per year, so that the added investment was repaid in approximately six months' time. These motors were installed on mill lines, on a motor-generator set, and on an air compressor.

Within the past three years this company has installed additional equipment, which was similarly equipped with synchronous motors where it was found desirable. The added cost of the motors involved over induction motors was approximately $7000. The power factor penalty has been eliminated, at a saving of about $4000 per year. The saving was not quite so large in this later move, since the last percentage of power factor correction is always more difficult to obtain. Hence it will take a considerably longer period to repay the investment.

The company is now in a position where it can purchase either induction motors or unity power factor synchronous motors and maintain the desired power factor merely by adjusting the equipment already installed.

9 Installation of two synchronous motors with leading power factor enabled a paper mill to increase the efficiency of power consumption, and cut costs by $180 per month.

10 Heavy production schedules of one company eventually overloaded the electrical distribution system to such an extent that rewiring seemed to be the only solution. However, the installation of 420 kva. of capacitors at properly selected points on the system raised the power factor from 55 per cent to 85 per cent, and eliminated the need for increased feeder capacity.

Electric Motors

11 A lineshaft in a mill required 100 hp. to drive it, and needed approximately 125 per cent starting torque. A general-purpose motor that developed 150 per cent starting torque at 600 per cent current was applied. Immediately motor starters began dropping out all over the plant. The difficulty was finally found to be the momentary voltage drop caused by the low-power-factor, high-starting current of the 100-hp. motor flowing through the line.

A high-starting torque, low-starting current, normal-slip motor with a starting torque of 250 per cent and a starting current of 500 per cent was substituted for the other motor, with a transformer type autostarter. On the 80 per cent tap of the starter this motor developed approximately the same starting torque as the original motor, although the current taken from the line was only 65 per cent of the former value, and at higher power factor. There was no more trouble from motor starters dropping out.

12 A 5-hp. high-slip motor was applied to a punch-press equipped with flywheel. The number of strokes per minute was so high, however, that the flywheel had practically no effect. Consequently, the motor never reached full-load speed, a condition which resulted in overheating and eventual burnout.

After careful consideration of the load characteristics, the flywheel was removed and a normal-slip 7½-hp. motor was installed. This motor has ample pull-out torque to drive the press through a stroke without the aid of the flywheel, ample thermal capacity for the duty cycle, and high efficiency.

13 Driving motors that had to start and reverse several times a minute were required for a special machine. At first, 5-hp. general-purpose, squirrel-cage motors were applied that had a starting torque of 150 per cent and a starting current of over 600 per cent. These motors overheated, and eventually burned out.

An analysis of the load indicated that 3-hp. high-slip motors with a starting torque of 300 per cent and a starting current of 400 per cent would be adequate. These motors, although smaller in horsepower rating, developed 20 per cent more starting torque with only 40 per cent of the starting current of the motors used at first.

The high-slip motors are running cool and consume considerably less power on starting and plugging.

14 A 7½-hp. short-time-rated, high-slip motor was applied to a pump that requires only 5 hp. This motor overheated and burned out. The winding was thought to have been faulty; therefore, the motor was rewound and put back into service. Just as promptly it burned out again.

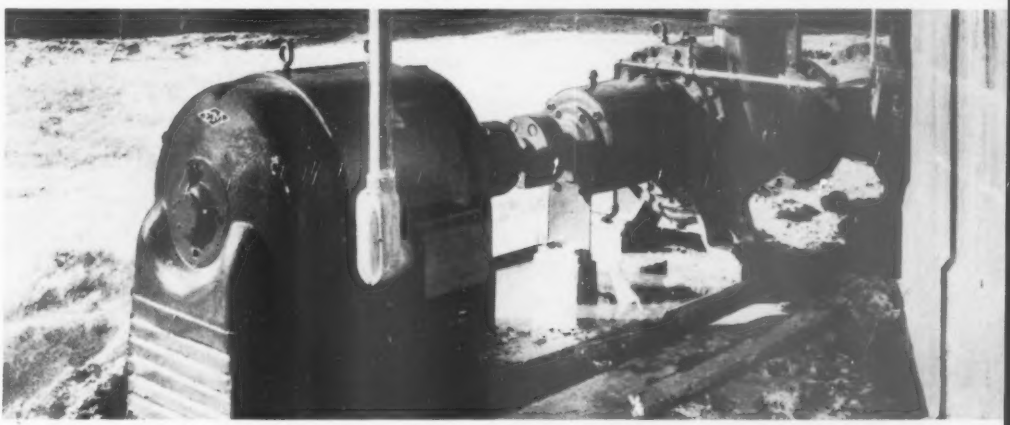
The pump in this case was a vital element, and its outage created a serious situation.

A brief checkup showed the cause of the trouble, which was cleared up when a 5-hp. general-purpose continuously-rated motor was applied.

15 When one of a large number of 75-hp. polisher motors in a glass plant developed a ground, it was found that the coil insulation had been completely roasted out and pulverized. This damage was traced to intermittent overloads under which the motor had to operate, whereby excessive coil temperatures occurred. Since all the motors were operating under the same conditions, it was apparent that they, too, would soon become defective.

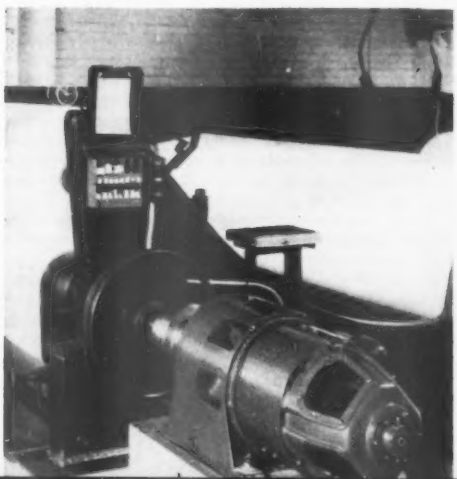
These motors drive a succession of machine units for grinding and polishing a continuous ribbon of glass. The polishing is done with rouge suspended in

THE TOTALLY ENCLOSED motors of this drillpress are not affected by oil and chips. Here an open-type motor would have short life. Operator controls position of motors and speeds and feeds the drills



SEVERE OPERATING CONDITIONS and exposure to the weather make no difference to this totally enclosed 100-hp. motor, because vital parts are protected. It drives a stock pump in a Southwestern paper mill

A D.C. MOTOR with inbuilt speed changer drives this paper rewinder, whose speed must be closely controlled



AN ADJUSTABLE-SPEED a.c. motor keeps this kiln in a cement mill turning at the proper rate at all times

water. To get the desired finish, the final polishing is done with dry material. The load on the units, therefore, varies with their position, those in the wet sections carrying light loads and those in the dry sections heavier loads.

As production demands increased, the speed of the glass ribbon and the pressure on the runner blocks were stepped up considerably. This change boosted the load so much that it was necessary to raise the setting on some overload relays in order to keep the motors on the line. To compensate for the different loads in the wet and dry sections, the motors were frequently alternated, but despite this precaution the coils still became dry and brittle.

Accordingly, a program of rewinding the motors, using glass insulation, was started. Since then there has been no more trouble due to burned-out coils.

16 In the Midland (Mich.) plant of Dow Corning Corporation more than 6000 three-phase motors are used in all kinds of service. Most of them are connected to nonshock loads, such as pumps and fans. Many are overloaded, however, and many others must operate under difficult service conditions.

Several overloaded motors that failed every few months were rewound with silicone insulation. For example, one of the rewound motors is rated 7½ hp., but it is connected to a 10-hp. load in a continuously wet location, pumping a salt solution. This motor formerly had a service life of from six to nine months. After being rewound, it was still in service after two years of continuous use.

Another motor, rewound as described previously, is rated at 20-hp., 3600 rpm., and drives a fan located on top of an oven for heat-treating metal. It has a hard starting cycle, and operates in a high ambient temperature. This motor has been driving a 30-hp. load about four months. Like this one, many of the fan motors are located on top of ovens and take only from seven to ten minutes to get up to temperature. In this period they are overloaded from 50 to 100 per cent, depending upon the design of the fan.

This rewound motor is standing up perfectly.

17 Installation of a 100-hp. enclosed induction motor in a Southwestern paper mill meant the difference between continuous operation with low minimum maintenance costs and frequent long downtime with high maintenance expense. This motor is located outdoors and drives a stock pump under extremely rugged conditions.

Dust, dirt, and water and other liquids are injurious to motor windings and other parts, eventually resulting in high repair costs. With properly protected motors the savings resulting from more productive running time and less need for maintenance are much greater proportionately than the increased cost for protective construction.

18 In one plant that was operating 24 hours a day under a heavy production schedule, a large number of variable-speed motors were subjected to excessive overloads under high ambient temperatures and high humidity. These motors ranged in rating from 2½ to 10 horsepower. Average life of the windings was about four weeks.

After the motors had been rewound several times it was decided to use glass-fiber-base insulating materials. This simple change increased the service life of the windings many times.

Adjustable-Speed Drives

19 The installation of an adjustable-speed induction motor on a box sealing machine increased production from 38,600 cartons per hour to 60,000 cartons per hour—a production increase of more than 55 per cent. This motor can also run down to a slow speed of 20,000 cartons per hour, which is highly desirable when producing another type of carton.

This particular machine handles at various times about five different types and sizes of cartons, so that the flexibility of easy speed changes is an important asset. Also, because the speed is smoothly adjustable, the exact rate for most efficient production is easily obtainable.

20 An adjustable-speed induction motor was applied in one plant on a monotype casting machine that produces type bars. The bars may be either cast or extruded.

The original drive consisted of a constant-speed motor with a mechanical speed reduction unit. With this arrangement considerable difficulty was experienced by the operator of the machine, resulting in defective output. Variation in the quality of the material resulted from slowing down of the machine, which gave a variable cooling time in the casting process. Since the type bar is produced in a continuous process, it is necessary that this cooling period be constant, so that the proper weld will result.

Adjustable speed is necessary because a number of different sizes of type bar are made with the same machine and different cooling periods are required, the length of the cooling period being in direct ratio to the size of the bar.

The new motor drives the machine at a constant speed at any pre-set speed. The former trouble has been eliminated. No slippage is observed at any speed or loading and consistent good welds and high quality output are obtained.

21 A paper products plant replaced the motors formerly used on its slitter-coaters and printing presses with adjustable-speed drives. The new units that were installed include both a.c. motors with electronically controlled eddy current clutches, and d.c. motors supplied by motor-generator sets.

Several advantages have resulted from these changes. For example, a better quality of printing is obtained because the best speed for the job can now be obtained.

Better coating of the paper also has been secured through selection and maintenance of the most suitable speed.

An additional advantage that may well be important in the long run is the reduction in wear and tear on moving parts that comes about from starting the machines at slow speed, without impacts.

ADJUSTABLE-SPEED DRIVES on these web presses cut make-ready time, and reduced wastage 45 per cent

22 Equipping the continuous web printing presses in one plant with adjustable-speed electric drives resulted in a 15 per cent saving in make-ready, plus a 45 per cent cut in the waste of material normally associated with that operation.

These adjustable-speed drives provide printing speed ranges of 8 to 1 to 12 to 1, which covers ordinary needs. They also make possible speeds down to about 1/25 of the maximum, for threading and inspection.

The operation of a web-type printing press requires that the material to be printed be unwound from one roll, run through the press and then rewound on the finished roll.

Economical operation of such presses requires:

1. That it be easy to "thread" the paper from the first roll through several others, and out to the finished roll. This is a hand operation and for safety's sake must be done at a low speed, preferably a slow, continuous creeping speed. Fast and certain stopping must be readily possible during this operation.
2. That the press be able to run at low speeds so that correct register can be obtained without excessive expenditure of time or excessive loss. A slow speed, somewhat above the creeping speed, is necessary.
3. That the press may be smoothly accelerated to the desired printing speed, which is 10 to 20 times the threading speed. Smoothness of acceleration avoids paper breakage or loss of register.
4. That the printing speed be readily adjustable over a wide range to accommodate different kinds of paper, types of inks, and rates of drying. For example, a new dryer might easily permit a 10 per cent increase in speed if the press drive equipment can provide it.
5. That quick, smooth slowdown and stopping can be accomplished for quality control, production, and safety. First, slowdown for inspection must be quickly accomplished without loss of material that is being printed. Second, creep speed is necessary for inspection and there must be fast, smooth return to printing speed. Third, fast stopping is necessary for safety.

23 In a metalworking plant an adjustable-speed drive replaced a multi-speed motor and belt drive that employed a combination of pulley ratios to obtain as closely as possible the optimum surface-cutting speed of a machine tool.

Each diameter of work piece required changing the pulleys and belts, which resulted in considerable loss of production time. With the new drive, any desired speed is obtained by turning a small rheostat to a predetermined position. The machine is then ready to operate at the optimum speed. Consequently, the quantity and quality of the output have gone up.

PRODUCTION INCREASED 300 per cent when this punchpress was equipped with an adjustable-speed drive

24 When inclinable punchpresses at Reliance Electric & Engineering Company, Cleveland, were equipped with adjustable-speed drives in place of conventional constant-speed motors, production was immediately tripled and the operating cycle of the machine changed from semi- to full automatic.

These punchpresses are used in the manufacture of stator and rotor laminations for a.c. and d.c. motors. Before the new drives were installed, the presses operated at a fixed speed.

After the adjustable-speed drive had been installed, the operator could select a machine speed of anywhere from 30 to 120 strokes per minute, depending upon the type of job. The dies and materials used previously were retained without change, but the ability of the operator to select the correct speed for each job tripled production rates.

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Electric Motor Controls

CONTROL BOARD FOR ROUTING BARRELS TO DESTINATION, AT RICHMOND PLANT OF STANDARD OIL CO. OF CALIF.

25 Manual and automatic controls in combination direct the operation of an extensive conveyor system in the new plant of Standard Oil Company of California, at Richmond, Calif. This plant handles the packaging, shipping, and storage of some 250 petroleum products.

The conveyor system was designed to carry 55-gal. steel barrels from filling stations in the packaging plant to dispatch or storage areas.

The basement conveyor area measures 250x200 feet. Barrels enter in one corner, passing the dispatch booth on a header conveyor that runs the length of the room. This header conveyor, a standard-design chain-drive roller conveyor, feeds 24 lateral gravity conveyors placed at right angles to the header. The laterals are grouped in units of six to serve four rail loading docks. Each lateral conveyor holds 80 barrels.

At the far end of each group of gravity conveyors is a power-driven collector conveyor section that feeds a one-way conveyor running between two parallel tracks, permitting diversion of barrels to the right or the left into box cars. There is room for four cars on each track. Although the collector conveyor (parallel to the header) is divided into four sections, its travel can be reversed so that barrels from any lateral can be delivered into any one of the four docks.

Beyond the 24 laterals there are three additional lateral conveyors, which dispatch barrels upstairs for warehouse replenishment, for export shipment, or to truck loading docks.

In the glass-enclosed, soundproofed dispatch station, there is a desk-level control panel that has a push-button for each of the 27 laterals. In front of the operator is a quantity record board with two sets of counters for each lateral, an "in" and an "out" counter. Extra buttons and counters have been provided for future expansion. Controls on the right start and stop certain sections of the power conveyors.

The operator works from the quantity record board, which he has previously set up to indicate the number of barrels to be shunted onto each lateral. For example, Lateral No. 1 may be set for 75 barrels for Redding, No. 2 for 80 barrels for Sacramento, and so on. Two telephone-type dials to the left are used to rack up the count, one dial being used for unit digits, the other for ten digits. The operator plugs in a switchboard-type plug to connect the dial and counters.

Barrels move past the operator at desk level at the rate of one every three seconds. On top of each barrel is a code indicating its shipping destination. In the two or three seconds the operator can look at the barrel, he punches the indicated pushbutton. This button breaks the beam of a photoelectric cell that registers the position of the barrel in relation to the lateral chosen, and energizes a diverter arm at the lateral. When the barrel reaches the proper lateral, an arm actuated by an electrically controlled air cylinder pushes the barrel off the header conveyor.

The quantity record board counts the barrels as they enter the lateral, and when the proper number has accumulated a light flashes to the right of the pushbutton corresponding to that lateral. The counter similarly tallies the barrels as they are moved out of the laterals onto the loading sections of the system, again flashing a light. The light flashes green to show a full lateral, red for an empty one. Controls that empty the laterals are operated from the docking side. Full and empty lights also flash on the dock side, so that operators may check counter controls that will give the status of any lateral at any time.

At the end of the header conveyor is the entry to a bypass conveyor, which loops back on the wall side of the header conveyor to take care of operator errors. The system automatically rejects any barrels sent into a lateral beyond the pre-set number, and returns any barrels the operator failed to register.

The system was designed to prevent any metal-to-metal contact that might mar the finish of the barrels. Therefore, diverter arms, and certain other parts, have rubber contact points.

26 A plant manufacturing a small device on a quantity basis with a conveyor system found itself with a large volume of orders for prompt delivery. The orders called for more than could be produced by a single shift, using all the facilities of the plant. But they were not sufficient to justify an additional full crew on the conveyor. The problem was how to accommodate the speed of the conveyor to the smaller group of operators on the second shift.

Change of speed outside the range of the control equipment on the conveyor was necessary. Obviously, purchase of complete new control equipment would not only be expensive, but would also mean considerable time lost while the equipment was being installed.

A simple solution was found in the installation of a process time-switch of the cam-operated type, suitable for repeating time cycles continuously. This time-switch was connected in the coil circuit of the starter for the driving motor. The timer was set to operate with the time-switch contact closed 50 per cent of the time cycle, and open 50 per cent of the cycle. As a result, the conveyor could be operated for the smaller crew with the time-switch alternately starting and stopping the motor. Use of a simple snap switch to short out the contacts of the time-switch during the period of regular operation obviated the necessity for disturbing the speed setting of the conveyor for the full crew.

The time-switch used in this application has a time cycle of sufficient length so that the driving motor on the conveyor did not overheat. In addition, the timer was provided with a means of adjusting the percentage of the time cycle while the contacts were closed, thereby allowing the conveyor to be operated at from 25 to 75 per cent of capacity, if necessary, without disturbing the rest of the equipment, and without additional expenditure.

27 The close control of temperature and humidity required in a hosiery mill is obtained by adjusting the speed of the refrigeration compressor, as needed. Air from the knitting rooms is sent through a spray-type dehumidifier, where relatively cool water is sprayed against it. This spraying adjusts the temperature and condenses excess moisture not desired or required for the maintenance of the proper relative humidity needed for full-fashioned knitting. The air is then forced through the duct system to the various knitting rooms.

Pneumatically operated automatic controls located in the various conditioned areas control the operation of automatic volume dampers and steam coils located within the ductwork for ironing out variations in relative humidity and temperature that may occur. In this manner temperature and relative humidity are maintained evenly, day and night.

In order to obtain a wide-range control of speed and close adjustment of the operation of the refrigeration compressor, this mill installed a magnetic drive with electronic control. The magnetically operated adjustable-speed coupling connects the motor to the compressor by magnetic means only. There is no mechanical connection.

The electronic control acts as a "nerve" between the magnetic drive and the compressor. When a temperature decrease is called for, the control senses the needed change and causes the magnetic drive to bring the speed of the compressor up to the new speed needed, and holds it there. When a temperature increase is needed, the action is the reverse—i.e., the magnetic drive reduces the compressor speed. Temperature and humidity variations are corrected immediately.

Refrigeration requirements, and consequently the compressor speed, vary through a wide range with changes in outside weather conditions, as well as inside load conditions in the knitting rooms themselves. However, compressor capacity is always closely matched against actual requirements, which means high economy of power consumption in the operation of the refrigeration plant.

28 Automatic control of the light system by means of a photoelectric relay assures one plant that adequate illumination will be maintained. The control pays for itself by keeping the lights turned off when they are not needed.

AUTOMATIC CONTROL for synchronous motors assures proper starting, prevents operator's errors

29 To safeguard both equipment and production schedules at a large steel fabricating plant, two older-type motor controls with inadequate short-circuit protection were recently replaced with modern, high-interrupting capacity, current-limiting controls.

Current-limiting fuses on this control will interrupt and clear heavy short circuits within one-half cycle of their occurrence, and take the motor off the line before further damage can occur—and before the main power line circuit breakers open and cut off power to the whole plant. Another important advantage is that with the new controls there is no chance of an operator making a mistake when starting the large synchronous motors.

Complete control is obtained from field frequency responsive relays that automatically start the motor, bring it up to speed, and apply excitation at the correct instant for maximum torque.

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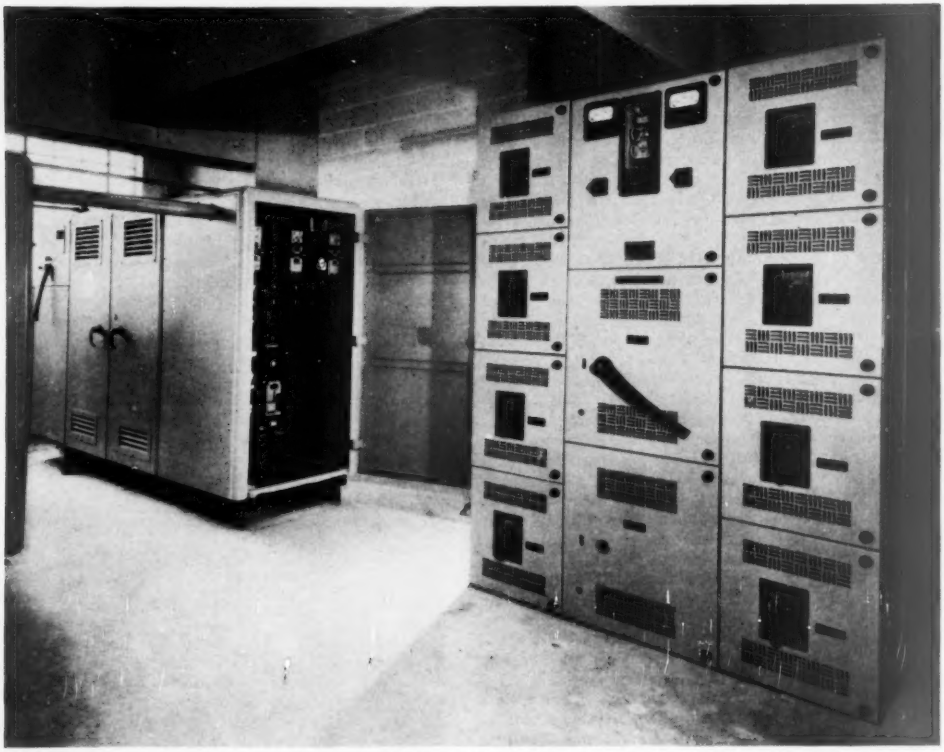


POWER CENTER CONSISTS OF TWO 300-KVA. AIR-COOLED TRANSFORMERS, WITH SEPARATE LOW-VOLTAGE SWITCHGEAR

Electrical Distribution Equipment

30 A Philadelphia metalworking plant faced the expenditure of a good many thousands of dollars to serve a potential 500-kva. load increase from an existing 2400-volt system, or the alternative of spending about twice as much to bring 13.2 kv. into the plant directly to the service transformers.

The latter choice now pays off at a calculated saving based on actual loads of around $250 a month, on a total power bill that averages more than $2000. The saving comes about through a rate difference earned by metering the supply at 13.2 kv. High-tension service has an average cost of about 5½ mills per kilowatt-hour as compared with about 7½ mills for the 2400-volt supply.

The main shop power distribution is 220 volts, two-phase, with a transformer capacity of 550 kva. It was considered highly desirable to supply the new load at 440 volts, three-phase, and to install 500 kva. of transformer capacity to serve present and future loads with three-phase energy.

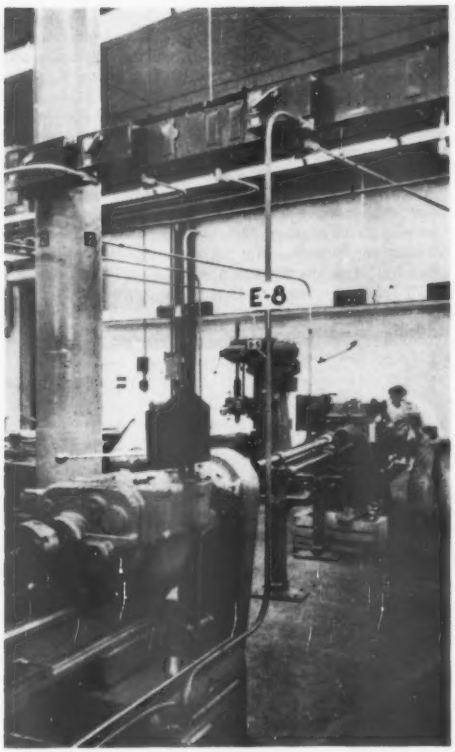
Reinforcement of the 300,000-cir. mil overhead 2400 volt system would have been inevitable, with new metering and breaker protection, as well as a new 500-kva., three-phase transformer. By providing for high-tension metering and distribution at 13.2 kv., a single set of lead-sheathed cables in underground conduits supplied both the two-phase load, through Scott-connected transformers, and the new three-phase transformer.

The realized reduction in cost indicates that the extra investment for high-tension distribution will be paid off by the saving in about three years or less. Furthermore, any new additions to the three-phase system will come on at the lower rate now in effect and increase the advantages of the high-tension rate.

31 Many old power systems already have the most desirable primary and secondary voltages and may have relatively modern primary switchgear, but have obsolete substations for stepping power down to the utilization voltage.

For example, such a system existed in a metalworking factory. The primary voltage supplied by the utility is 13.2 kv. The 13.2-kv. metal-clad switchgear is less than ten years old. Utilization voltage is 460 volts. However, the substations were very large, 5000 to 10,000 kva. each, had inadequate switchgear, and were in poor condition.

The area around the substations had become so congested that the old oil-filled transformers represented a real fire hazard. Voltage drop in the system was about 20 per cent maximum, causing many operat-



BUS DUCTS AND SHORT CONDUIT RUNS TOGETHER

ing difficulties with utilization equipment, such as failure of fluorescent lamps to light.

A review of this system showed two things: (1) There were many large motors that could better be served at 2400 volts instead of 460 volts. (2) Small substations around the factory area would cost less than larger substations, improve voltage conditions, and allow several thousand feet of old secondary feeder cable to be sold for scrap, increasing the savings possible with the load-center system. The system adopted cost about 10 per cent less than replacing existing substations, and decreased voltage drop from 20 to about 2 per cent maximum.

Putting in some substations with 2400-volt secondaries made it possible to have the larger motors (above 200 hp.) which were purchased new, rated 2300 volts instead of 440 volts, as with the old system.

32 To keep peak demands down, Lee Tire & Rubber Company, Conshohocken, Pa., installed meters that check the demand as indicated by the power company's equipment, and which by observation and arrangement of indicators tells the power plant personnel when an excessive demand is about to occur.

The demand is on the basis of a 30-minute interval, and the alarm equipment is so arranged that notice is given at the 15-minute interval of a prospective demand exceeding a pre-set value. That gives the engineers a chance to notify the department which is the maximum power user, and invariably it has been possible to limit the current used during the next 15-minute interval to the point where the demand is kept within predetermined limits.

Since there are two substations, a rather complicated setup was required and the equipment cost $1100. It has, however, brought results: (1) As a check on the power company's meters it became possible to get a $3000 refund over a two-year period where excessive demands had been under protest; and (2) by enabling the company to limit the demand it has been possible to reduce the average power bill about $150 per month. This saving alone paid for the demand meter equipment in less than a year.

33 A paper mill scheduled the starting time for machinery in the plant so as to avoid the usual peak loads at the start of shifts and after lunch. The result was a $200 reduction in the monthly power bill.

34 The cause of the high demand peaks in a small plant was traced to simultaneous operation of a 25-hp. motor and a 30-kw. electric oven. Installation of a timing relay on the oven to permit it to draw current for 7½ out of every 15 minutes, and an interlock on the motor, which was used only a few minutes each hour, cut the demand by 64 per cent, with a corresponding saving in the power bills.

35 Temporary use of bus duct in an unusual way enabled a Midwestern industrial concern to make considerable saving in labor and material.

In the face of a heavy increase in plant load, it was decided to scrap the old overloaded switchboard in favor of a modern board of greater capacity. Control and protection for each existing circuit, however, was to be transferred to the new switchboard with practically no interruption to service.

To accomplish this, 2000-amp. feeder duct was installed for service between the 1500-kva. transformer bank and the new switchboard. A run of 1350-amp. duct was used for temporary electrical connection between the two boards.

Short duct-runs were provided for connecting old circuits to the new board. These runs left the board vertically and angled to tap boxes mounted nearby at ceiling height. Existing conduit feeders (controlled by the original switchboard and serving plug-in duct-runs throughout the plant) were cut in the tap boxes, one by one. Thus all circuits were gradually transferred with a minimum of trouble from the original to the replacement board.

When the changeover was completed, the duct tie between boards was dismantled by sections and used elsewhere in the plant.

36 In one plant the problem of supplying d.c. power was solved entirely apart from the general distribution system by the installation of speed control units on all equipment driven by d.c. motors. Energized from a.c. lines, these units produce d.c. power on the spot. They made it possible to eliminate the central motor-generator sets and d.c. circuits entirely, effecting substantial savings in the cost of the copper required for a new distribution system.

37 Prefabricated busway for the lighting system recently saved money and time for a metal fabricator. This company had built a new plant, but before

production was well under way need was discovered for higher lighting intensities in certain areas. Installing new fixtures and running conduit lines to them would have been inconvenient and costly. With the busway, installing the new luminaires became simply a matter of spacing them where they were needed, and plugging them into the duct.

Later it was desired to put some 120-volt electrically driven hand tools in service, and provide proper lighting for several relocated production lines. Again, power for both lights and tools was immediately available by plugging them into the overhead duct.

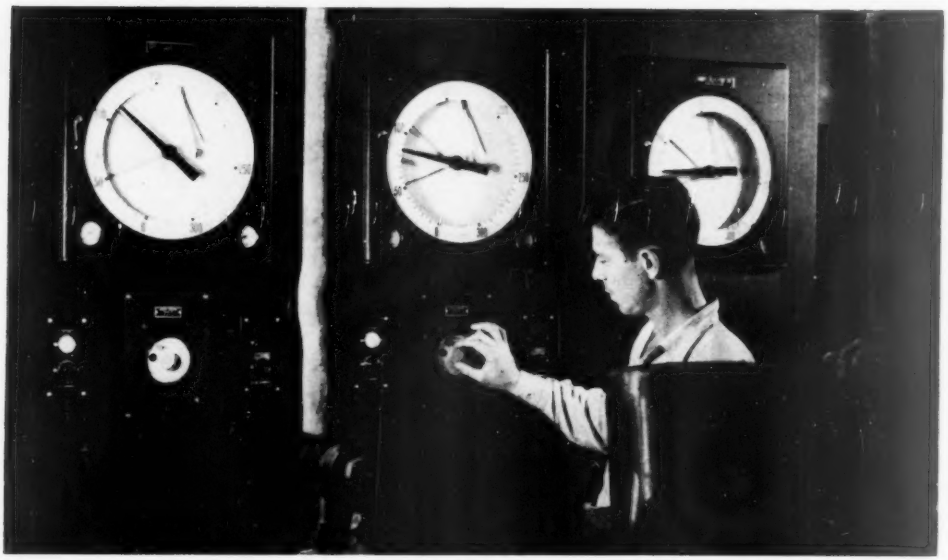
38 Use of air-cooled power centers made possible a considerable saving in the cost of the distribution system for a new steel fabricating plant. The building is "L"-shaped, the main leg being 600 feet and the short leg 286 feet long. Power supply for machines and the lighting system comes from two air-cooled power centers mounted between the aisles and well above the floor. The transformers are rated 750 kva. each, and step down 6900 volts to 208/120 volts. The system is three-phase, four-wire, 60 cycles.

Bus duct carries the power throughout the building. It has a capacity of 1000 amperes near the transformers and tapers to 400 amperes.

Placing the power centers overhead saved much needed floor space for manufacturing. They are out of the way of all moving parts and are safe because they contain no liquids. The units are protected on the sides by large beams, and are completely enclosed.

Another advantage is that these power units are in the center of the electrical load, which is always a desirable condition.

Meters and Instruments



INSTRUMENT CONTROL OF SIZE COOKING AND STORAGE IN A TEXTILE MILL CUT MATERIALS USED 25 PER CENT

39 A wattmeter, voltmeter, ammeter, and power factor meter comprise a kit that enables a spring manufacturing plant to solve a variety of production and electrical problems.

For example, a foreman complained that the motor on a hydraulically operated cutoff machine was not powerful enough. Test with the instruments showed that the motor operated satisfactorily through a portion of the cycle, but was overloaded at another point. The ampere and kilowatt readings went up and the power factor reading went down. It was then found that a valve was opening up improperly because of worn cams, and the resulting increase in pressure caused overloading of the motor.

A somewhat similar problem was encountered with a drill having a hydraulic feed. For the first few hours after a shutdown, when the oil was cold, the motor would trip out frequently on an overload. Tests showed that the motor had sufficient capacity when the oil was warm. Therefore, a heating unit was installed on the machine to keep the oil warm. A larger motor was not needed.

40 All motors in the mill of a large copper and brass products plant are protected, of course, by thermal overload relays. These relays will safeguard a motor against sudden severe overload, but they will not necessarily take it off the line in the event that it becomes hot from long sustained overloads that are not quite heavy enough to cause the relay to operate.

Such overloads, nevertheless, tend to shorten seriously the life of the insulation.

To meet this situation ammeters have been mounted on a good many machines. Frequently these ammeters have a special scale calibrated in speed, pressure, or whatever unit is best understood by the operator of the machine. He is then instructed not to let the needle go beyond a certain point. Usually the safe operating range on the scale is left white, while the overload area is painted red.

With a careful operator this simple scheme is very effective in protecting a motor against sustained overloads that might cause serious overheating.

41 Formerly, when mercury or spirit thermometers were used in a dairy to check the temperature of a cold storage room for milk, much time and effort went into the continuous traveling from chest to chest. At best, however, the engineers had only an intermittent guide to correct refrigeration.

Off-temperatures became a thing of the past after a temperature recorder was located in the power plant to provide an accurate record for all chests. Thus, stocks are safer, because temperature can be kept more strictly within limits. Fuel is saved since there is no longer any need to over-refrigerate.

The recorder used is a multi-point instrument capable of recording as many as sixteen readings.

42 By using an ordinary watt-hour meter instead of an ampere-hour meter to provide accurate control of current in electroplating permanent magnets, Westinghouse Electric Corporation has reduced the cost per meter and eliminated expensive and cumbersome shunts across the plating electrodes.

The watt-hour meter is connected to the alternating-current side of a rectifier, such as is used to supply direct current for electroplating. A contact on the register closes after a predetermined amount of energy has passed through the meter, and operates a circuit breaker that opens the plating circuit when the desired thickness of deposit is attained. Since the voltage of the alternating current is substantially constant, no special ampere-hour meter or timing device is necessary to obtain accurate results.

The watt-hour meter was placed on a switchboard some distance away from the plating tank. Use of an ampere-hour meter made it necessary to locate the shunt near the plating tank. This arrangement took up much valuable space. Also, it was necessary to protect the shunt and the lead from the plating solution and the fumes arising from it.

43 At one time the management of a large foundry, like many other industries, paid for lots on the basis of chalk marks on the side of a machine. At the end of the shift there was always an argument as to the number of chalk marks versus the amount of work produced.

The amount of downtime claimed by the different operators whenever equipment broke down also created its share of disputes. These conditions have changed since some meters were installed.

For example, sand-mixer operators are paid on the basis of the numbers of batches produced daily. In order to record the batches produced by each mixer, a recording ammeter located in the department offices shows what the mixers are doing at all times, and provides a complete record for each shift.

These charts show at any given moment how many batches have been mixed at that time. Also they show whether full batches or half batches are mixed. Some jobs require a full batch and others only a half batch. If an operator, by mistake, puts only one wheelbarrowful instead of two into the mixer, the mistake is brought to light on the chart.

Both management and labor are pleased with this accurate recording system in furnishing indispensable information.

To measure downtime on the production conveyors another recording meter system is used. The motors operating the various molding conveyors are connected to a multi-pen instrument. Charts from this instrument accurately record interruptions in conveyor operation and furnish an extremely important record of downtime as well as running time. This meter is located in the superintendent's office.

Temperature-recording charts have been found to be of indispensable value in keeping track of temperatures inside of core baking ovens and the length of time that the cores are baked. A record is kept on the chart of the actual starting time and the time that the ovens were shut off.

The same type of temperature recorder mentioned above also is used in the engine room to keep a record of weather conditions.

Air flow recording meters are used at each cupola to keep a record of the exact amount of air and the pressure used during the melting operation.

44 A large paper mill that produces high-grade paper relies on indicating and recording instruments to keep the quality of its product high and uniform and wastage low, and to check production during the final finishing process.

In the manufacture of many types of high-grade paper, the final gloss or finish is applied by a supercalender. Since variations in gloss spell rejects in the final product, continuous measurement of this variable permits the operator to make the necessary machine adjustment as soon as any deviation from the specified gloss occurs, and before an appreciable quantity of unsatisfactory product has been produced.

Lacking continuous gloss measurement, the operator must rely on periodic laboratory checking and a sizable amount of off-gloss paper can be produced before the condition is detected and corrected.

The operating speed of any piece of production equipment is obviously an important factor influencing daily output and therefore affecting operating costs. Accurate indication of this variable aids the operator in maintaining optimum speed and, consequently, maximum production. A chart record of the speed provides a means of checking on daily or hourly output.

45 Cooking and storage of sizing mixture are important processes in the operation of preparing yarn for further processing in a textile mill. Any variations in the characteristics of the finished sizing mixture are directly reflected by increases in rejects and in operating expense in the weave room.

Application of electronic instruments to the size-cooking and storage operation in one large mill have resulted in a direct saving of 25 per cent in the amount of finishing materials used in the size formula. There are also additional savings in the weave room due to the production of uniformly sized warps.

Continued on next page

EYES SIMPLY CANNOT COMPETE WITH THIS PHOTOELECTRIC SCANNER IN DETECTING PINHOLES IN METAL STRIP

Electronic Devices

46 Inland Manufacturing Division of General Motors Corporation, Dayton, turns out more than a million feet per day of various shapes of tubed rubber strips for the automotive, railroad, and refrigerator industries. These strips are cut to different lengths, varying from 18 to 128 inches.

The conventional practice in tubing operations of this type is to extrude the shape from a rubber tuber onto a belt conveyor synchronized to the speed of the tubed article. When it reaches the desired length, it is cut manually by an operator. This method was highly undesirable, inasmuch as the human element determined when the butcher knife should fall. Sometimes it fell too soon, and many times too late. This resulted in a large end-loss because, when the article was cured and cut to the finish length, the too-long cut was scrapped.

All of the tubing units were equipped with photoelectric cells that actuate a special device that cuts the piece to the exact length. In addition to the savings in material, it became possible to eliminate one operator per shift per unit. The entire investment per unit was under $500, while the return has been many hundreds of times the capital investment.

47 One food manufacturer is using a photoelectric egg tester, which eliminates errors of human judgment in grading the condition and freshness of eggs. The machine measures, among other things, the roundness of the yoke, and automatically rejects undesirable eggs.

48 So that there will be no jamming of cartons at positions where conveyors meet, photoelectric timing relays are being used to police belt and roller conveyors in the packing department and ware storage sheds at the plant of the Maryland Glass Company, Baltimore, Md.

These photoelectric relays are located so that if the run becomes blocked a carton intercepts the light beam. When this light beam is intercepted for more than ten seconds, it causes the timing relay to operate and shut off the motors that drive the belt conveyors. When the light beam is re-established, the circuit is again completed and the conveyor is automatically started up again.

49 One food packaging company is using phototubes for two unique purposes. One is in a sorting machine. The tube, sensing certain markings on the cartons, sends each carton to the proper location.

Another use of a phototube by the same food packers is to check the degree of vacuum in a can. Light is reflected by the concavity of a tin can in a direction determined by the value of the vacuum in that can. It will be reflected in a certain direction if the degree of vacuum is satisfactory. If the degree of vacuum is unsatisfactory, the light is reflected in another direc-

tion, operating a relay to remove that can from a production line.

50 Adoption of electrostatic spray-painting by a manufacturer of refrigerators brought about three important advantages: (1) A saving of more than $100,000 a year in the cost of paint and labor; (2) about 45 per cent more production in a smaller space; (3) reduced costs for cleaning and ventilating the spray booths.

The parts are electrically grounded, and are surrounded by a high-voltage grid that creates a strong electrostatic field. As the finely atomized particles of paint leave the spray gun, they get into the electrostatic field and become charged to the opposite polarity from the work. Therefore they are attracted to it and are deposited in a smooth, uniform coating.

51 In another plant large metal containers previously were sprayed by hand in the usual way. One gallon of the enamel covered only 10 to 15 containers, because so much was wasted through failure to strike the work.

When the electrostatic process was installed, it immediately became possible to finish twice as many containers per gallon. Quality of the finish also was improved.

52 In the manufacture of foam rubber mattresses, 35 minutes used to be required to cure a double-bed piece, when the heat was supplied by a steam jacket. With that method, curing proceeded slowly from the outside to the center, and close control was difficult or impossible to obtain.

Now dielectric heating cures the mattresses completely and uniformly in a few seconds.

53 In one metalworking plant a brazing operation was necessary on a certain part. With the method formerly used, a skilled worker required four minutes to perform that operation.

When induction heating was substituted, it was found that unskilled women could do the job in 40 seconds. A further saving was made by eliminating the subsequent inspection, which the dependable uniformity of the work made unnecessary.

54 Soldering 30 connections on a part used in aircraft required 15 minutes when the job was done by the old method, one connection at a time with an ordinary soldering iron.

Putting induction heating equipment to work on this job cut the time to 15 seconds.

55 A plant that manufactures steam boilers has made important savings by applying a nondestructive test in selecting boiler plate. The purpose is to make sure that the plates are free from flaws that might not show up until after the welding operations have been completed.

The testing equipment utilizes ultrasonic waves. An electronic generator energizes a quartz crystal with pulses having a frequency up to about 12,000,000 cycles per second. The suitably housed crystal is held against the plates, or other material to be tested, and transmits the ultrasonic pulses to it. If they strike a flaw, the pulses are reflected back to the crystal. The lapse of time between the transmission and return of the wave is indicated on a cathode ray oscilloscope.

With this equipment it is easily possible to determine the location and size of any flaw.

56 In a foundry a battery of photoelectric cells enables one man to control the pouring of several molds at a time, from a safe distance. The usual hazards associated with hand-pouring have been eliminated. Also, several molds are now poured in less time than was formerly required to pour one.

Empty molds are carried on a conveyor and spotted so that each one is in the proper place in front of a ladle. The photoelectric cells are located directly above the molds, in line with the riser. Through a pushbutton control the operator tips all the ladles simultaneously.

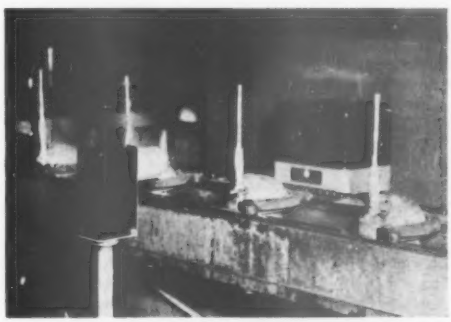
When the molten metal has filled the molds and come up in the risers, the light that it gives off causes the control to drop the ladles back immediately and automatically.

57 A brass products plant installed an electronic flaw detector and virtually eliminated losses amounting to about $2000 a week, caused by breakage of tools. In addition, the life of the tools was increased considerably, while production went up about 60 per cent.

This flaw detector will pick up defects a small fraction of an inch long. It comprises an oscillator that sends a high-frequency alternating current through a detector coil. Stock to be tested is passed through the coil at speeds up to 80 feet per minute. When a flaw is encountered, the device signals the operator and stops the machine that passes the stock through the coil.

58 In a large glass plant an electronic flaw detector of different type now inspects the lips of bottles and jars faster and better than the human inspectors formerly employed. These inspectors usually missed, on the average, about two out of a hundred defective containers.

As they come from the molding machines, the containers are automatically moved in front of a photoelectric tube and spun around rapidly while a light is thrown on the area to be inspected. The steady light reflected by a perfect container will not affect the tube. However, a container that has any imperfections on the sealing edge reflects a flickering beam that will cause the tube to act and, through the associated equipment, reject the defective piece.



A PHOTOELECTRIC RELAY never misses, never gets tired of counting objects that pass on the conveyor

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Communication Equipment

WITH A FASCIMILE TELEGRAPH SYSTEM, WRITTEN MESSAGES ARE RECEIVED AS FAST AS THE SENDER CAN WRITE THEM

59 Several thousand dollars a year are saved by an annunciator system in one of the departments of the Kingan & Company plant, Indianapolis.

About 75 employees work along a production line that consists of an overhead rail conveyor system. The conveyor moves at a linear speed of 20 feet per minute and is driven by a 15-hp. motor. Along the 300-ft. length of line there are 18 pushbutton stations, installed at locations where it is considered essential that workers in those particular areas have control over the conveyor motion. The standard procedure is to keep the line moving continuously excepting, of course, for the lunch and rest periods.

There are numerous times throughout the day, however, when the workers find it necessary to stop the conveyor at any one of the 18 stations, for reasons of inspection, bottle-necks, or accidents. It has been estimated that this downtime costs the company approximately $5 per minute. It is, therefore, essential that the department foreman get to the trouble spot without lost motion and take steps to continue production with the least possible delay.

Heretofore, there was some confusion and lost time in directing the foreman to the correct location. Over a period of a day considerable time was wasted.

In order to improve this situation the chief electrician designed and had constructed a special annunciator system that is inter-connected with the control circuit of the conveyor motor. The annunciator board is constructed of metal and is about 20 feet in length. Its mounting height is about 12 feet, and it is placed in such a position that the foreman can see it regardless of where he may be.

The board consists of a series of translucent plates about 1 foot square. They are numbered from 1 to 18 and each section has an enclosed signal lamp. When the conveyor chain is stopped at any one location the annunciator automatically flashes the number and station responsible. The foreman's attention is immediately called to the particular trouble area; he can proceed there directly and take action.

This signal system has definitely proved its value. Since its installation there have been fewer stoppages and those that do occur have been reduced in duration. The annunciator also serves another purpose other than the original intention. The workers hesitate to stop the conveyor at their station since their number flashes on for all to see, indicating that their station is responsible for the shutdown. This is an important factor, considering that the department works on a group bonus plan.

At a conservative estimate of 5 minutes saved during an 8-hour working period, the saving amounts to approximately $25 per day, or $7000 per year.

60 A manufacturer of brass products with a rented installation of several hundred telephones discovered that a number of these instruments, for which there was a high monthly charge, could be eliminated. In their place there was substituted a purchased intra-plant communication system which will permit a number of employees to intercommunicate throughout the plant.

This installation was amortized within 18 months by the elimination of the rented stations. A further saving was made by the elimination of certain positions on the switchboard no longer required.

61 In another plant it was found that the shipping room was making many calls per day to the order service department. These calls entailed extra work on the part of the operators and tied up the outside telephones in those two departments for many hours per day. The installation of a plant communication system permitted these two departments to communicate at will, leaving their outside phones available for other calls.

62 In a hardware manufacturing plant the production manager received many calls every day from the sales department, tying up these two important points with calls that could be handled over a private

system. Installation of a private telephone system resulted in much greater efficiency in both departments. Also it left the two outside telephones open for calls from customers or other points in the factory.

63 In a western dress manufacturing plant an annunciator saves time in servicing the sewing machines. Each machine is provided with a toggle switch that controls a lamp of the annunciator.

If an operator requires cloth or is out of thread, or her machine has broken down, she flips the toggle switch and the number of her machine shows up on the board. The annunciator is visible from all parts of the room. Hence the supervisors know at all times what machines need attention and where they are.

64 In a large automobile plant, a facsimile telegraph system saves many hundreds of telephone calls a day, plus delay in transmitting important information.

For example, machines comprising this system are installed in the two receiving departments. From these departments several hundred reports are made daily to the inspection and purchasing departments covering arrivals of materials. The latter departments thus have all necessary information within 15 minutes after material is received.

Well over a thousand calls per day would be required to make these reports by telephone. The facsimile telegraph, on the other hand, notifies both the inspection and the purchasing departments at the same time, in one operation. As a result, the cost of telephone service has been reduced and from 4 to 6 hours a day are saved in notifying the various departments of receipts of materials and supplies.

65 On duty 24 hours a day, a robot "announcer" is keeping management employees of Westinghouse Electric Corporation, East Pittsburgh, right up to the minute on company news. By dialing a special number on their in-plant telephones, supervisory employees can listen in while a continuous tape reels off the latest developments.

Designed to keep supervisors at all levels abreast of policy matters, labor relations, new orders secured, production loads, backlogs, outstanding services rendered customers, quality of products and its effect on increasing sales, the robot announcer is saving considerable time for plant executives. It is now possible to pass on a greater volume of information without any individual having to repeat the same story over and over. It's accurate, too.

The system works as follows: A script is prepared on the subject to be discussed, then recorded on a standard tape recorder and later transferred to a circular metallic tape that runs continuously. A system of electrical circuits amplifies the message and channels it into the plant's telephone system, where 30 calls can be handled at the same time.

The average message runs from three to five minutes. New recordings are made two or three times a week. At the end of the "broadcast," an announcement is made as to when a new message may be expected. Because it takes less than half an hour to make a recording, important news can be covered quickly.

66 Savings of at least $3000 a year are made by a paint manufacturer through the use of a facsimile telegraph system.

While paint pigments are going through the manufacturing processes at this plant, the control laboratory must make tests continuously on the product in various stages. Samples are taken and sent by messenger to the laboratory at the rate of about 200 every 24 hours. As soon as the sample tests are completed, the laboratory must notify the manufacturing departments of its findings, quickly and accurately. If reports are delayed, or inaccurately transmitted, large losses may be incurred.

The facsimile system transmits these laboratory test reports instantly and accurately from the control laboratory to the grinding and other departments. These transmitted written reports save messengers, reduce the time it takes to get reports back to the proper departments, eliminate errors, and avoid scrap losses and costly reworking.

67 Use of a facsimile telegraph system has enabled a candy manufacturer to establish much closer inventory control over materials supplied to the production departments and greatly reduce wastage. The resultant savings are estimated at thousands of dollars per year.

Formerly the foreman of a shipping or manufacturing department wrote out a requisition for packing materials, or findings, as they are termed. It was sent to the first floor by the elevator operator. There all forms were collected by a clerk. Truckers took an order or group of orders for a certain manufacturing or packing department and went to storage spaces all over the building to fill their orders. The orders were then assembled, placed on trucks, and delivered.

There was no double-check on the count made by the trucker when the materials were delivered. No tally was made of quantities delivered against those ordered, nor of the amount of findings still in the storage spaces. Also, several truckers might be on the same floor at the same time, picking up findings for different orders.

The constant movement of the truckers resulted in congestion on the elevators, delays in filling findings orders, and much dead-weight movement on the part of truck and elevators. There were frequent errors in requisitions and deliveries of incorrect amounts removed from storage and received by departments. Errors appeared in periodical inventory check-ups, and were repeated in annual inventory figures. As a result, production was often delayed while the purchasing department attempted to replenish depleted stocks.

The facsimile system has made it possible to:

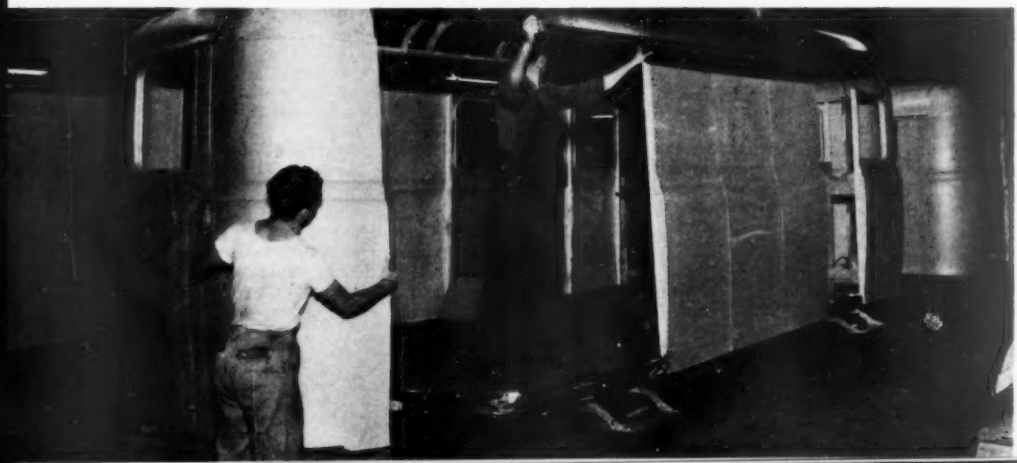
1. Speed up requisitioning of materials and insure prompt and accurate delivery from stockrooms.
2. Maintain an accurate inventory of all findings, both on incoming materials and on supplies delivered to manufacturing departments.
3. Save the time of one employee by better coordination of work, thus permitting his transfer to a more productive job.
4. Effectively route truckers with capacity loads to and from storage and manufacturing departments.
5. Make more effective use of elevators by controlling movement of findings, so that a trucker never leaves the floor, delivering findings to or from the elevator and the manufacturing departments.
6. Keep the purchasing department closely posted on supply and use of findings, so that re-orders can be placed before stocks become exhausted.

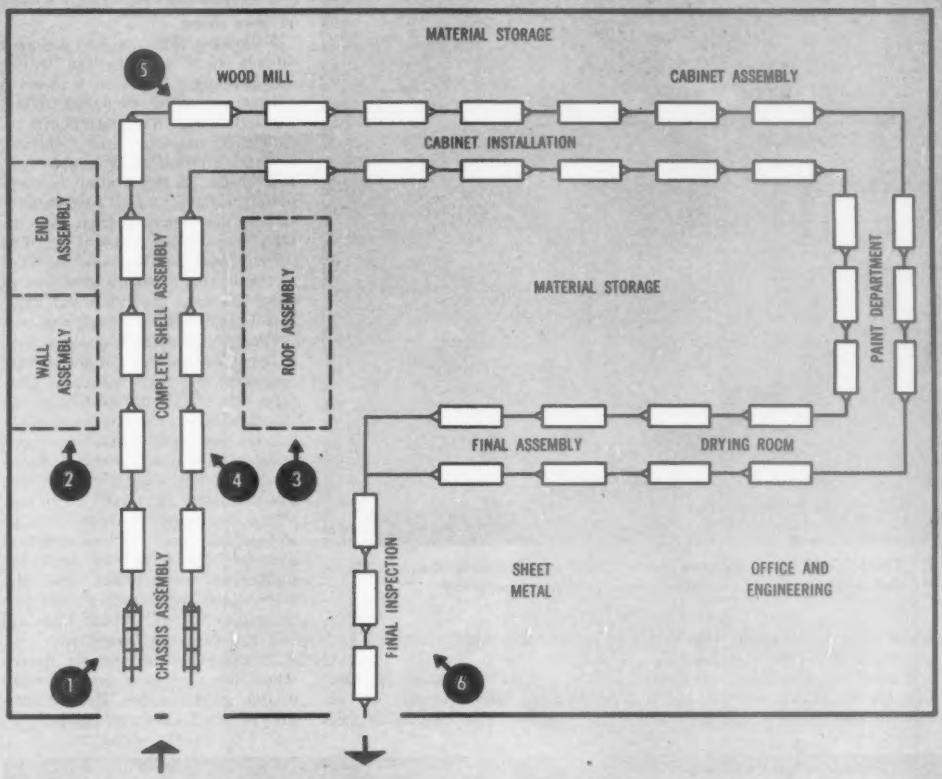
1. START OF ASSEMBLY brings together chassis components. Frame, undercarriage, and platform are assembled as a unit on jig. From this point on, trailer moves along line on its own wheels

2. OFF-THE-LINE assembly of trailer side panel insures uninterrupted production on main line

3. OFF-THE-LINE assembly of roof and end sections (not shown) keeps chassis moving

4. TRAILER TAKES SHAPE as pre-assembled roof, side, and end panels are joined to chassis. Overhead hoists and special dollies for the component sections greatly simplify this assembly job





NEW, STRAIGHT-LINE ASSEMBLY LAYOUT. NUMERALS INDICATE THE LOCATION OF CORRESPONDING PHOTOGRAPHS

Straight-Line Assembly Cuts Unit Cost 25 Per Cent

D. D. AREHART • PRESIDENT, PALACE CORPORATION
FLINT, MICH.

UNTIL QUITE RECENTLY, all of our trailers were virtually custom made. Even "standard" models were produced on a job-shop basis. A change to the straight-line assembly shown in the diagram above has paid off four ways:

1. Unit production cost is down 25 per cent.

2. Materials handling cost has been cut approximately 40 per cent.

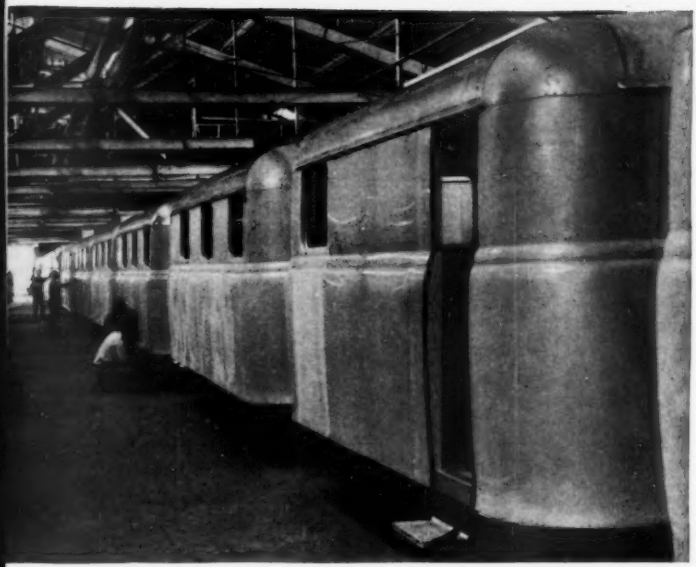
3. Production volume is more flexible than before, and the present capacity is 50 per cent above its former level in the same area.

4. Worker effort and worker fatigue have been reduced; we have no way of measuring just how much, but we do know the situation is greatly improved.

Under the old arrangement, component parts were delivered to the various stations and the complete trailer assembled at one point. This caused considerable crossing and back-tracking of material flow lines. Production was slow and cumbersome. Excessive floor area was required. Unit assembly costs were too high.

The new "double" assembly line provides the utmost flexibility for meeting seasonal demands and schedules.

Assembly begins at one end of the



5. TRAILER SHELL receives insulation, wiring, paneling, doors, cabinets, and molding as it moves along main line before painting

plant with build-up of the basic chassis, with frame, undercarriage, and platform assembled into units. The chassis then moves to the linoleum operation, where the platform of the trailer is covered with linoleum.

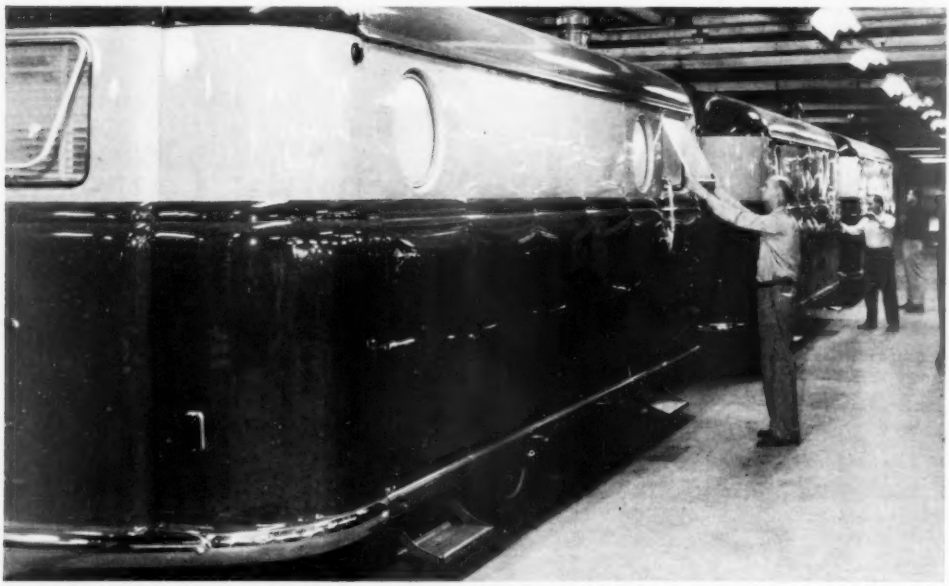
At the next line station, the shell is built up. Roof assembly, end assemblies, and side assemblies meet the chassis and the trailer begins to take shape.

Following this, the line makes a 90-deg. turn and, as the trailer moves along this section, it receives all inside framing, electrical wiring, insulation, door hanging, cabinet installation, paneling, and moldings. Around another right-angle turn, the inside of the trailer is completely sanded and all foreign substances are removed from the outside, preparatory to painting. The paint booths, in this same segment of the line, are fed by 3500 feet of paint line from the five 50-gal. pressure tanks in the mixing room.

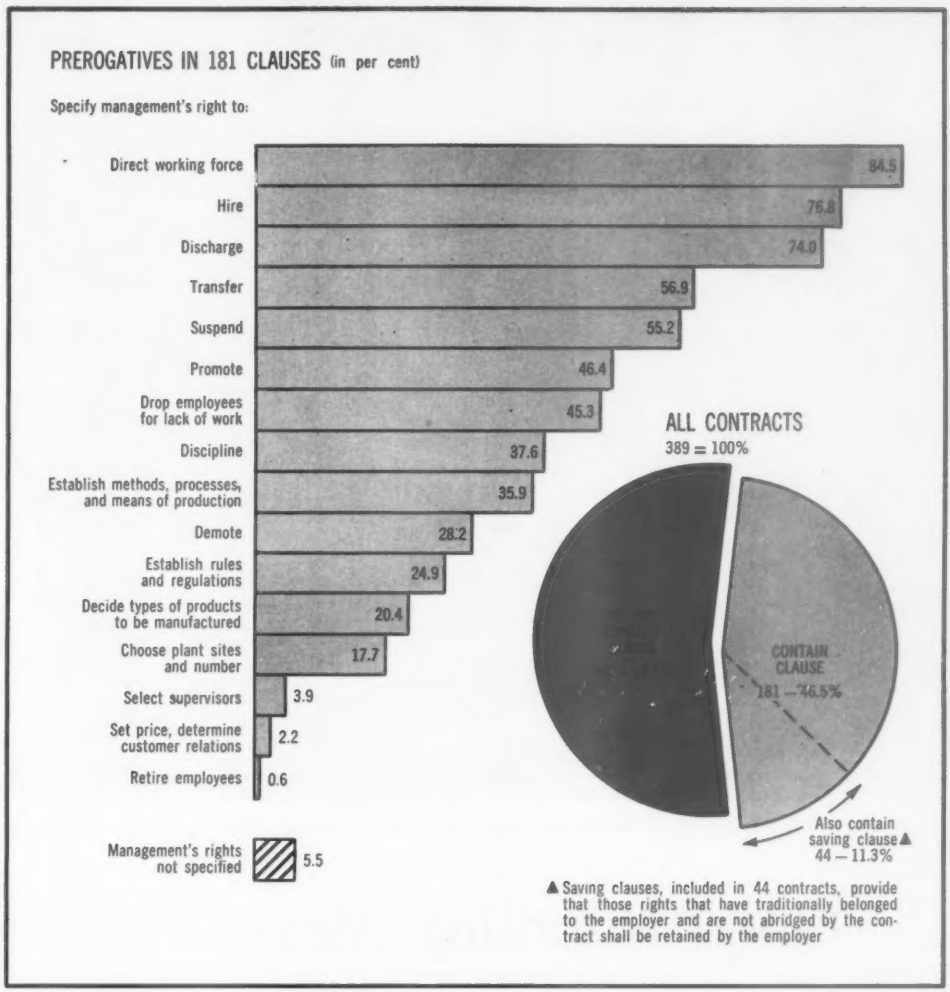
From the paint booths, the trailer moves directly through the drying operation and then makes another turn into the home stretch. Along this final assembly line the following are installed: windows, stoves, beds, screen doors, cabinet finish parts, venetian blinds, window curtains, general trim, and furniture.

The two assembly lines converge at the final turn. Trailers receive a complete inspection by both the production department and the sales department before they are permitted to roll off the line and out into the yard for delivery.

It was a big decision for Palace when we discarded our job-shop method of production. Results have proved the decision was right.



6. COMPLETED TRAILERS from the two assembly lines move into a single line for final inspection. They are inspected by both sales and production departments before they roll off the line for delivery


PREROGATIVES IN 181 CLAUSES (in per cent)
Specify management's right to:
Direct working force 84.5
Hire 76.8
Discharge 74.0
Transfer 56.9
Suspend 55.2
Promote 46.4
Drop employees for lack of work 45.3
Discipline 37.6
Establish methods, processes, and means of production 35.9
Demote 28.2
Establish rules and regulations 24.9
Decide types of products to be manufactured 20.4
Choose plant sites and number 17.7
Select supervisors 3.9
Set price, determine customer relations 2.2
Retire employees 0.6
Management's rights not specified 5.5
ALL CONTRACTS
389 = 100%
CONTAIN CLAUSE
181 — 46.5%
Also contain saving clause▲
44 — 11.3%
▲ Saving clauses, included in 44 contracts, provide that those rights that have traditionally belonged to the employer and are not abridged by the contract shall be retained by the employer

Management Prerogative Clauses

in Union Contracts, May 1, 1949

To SECURE RECOGNITION of their responsibility for the operation of their businesses, employers in about one-half of the 389 union contracts analyzed obtained management prerogative clauses. Such clauses usually state that the employer has certain rights, such as the right to direct the working force; to promote workers; and to establish methods, processes, and means of doing business. Some employers, however, feel that the management prerogative clause is self-defeating. They feel that management's prerogatives are inherent and that a right defined is a right limited, and have not attempted to include such clauses in their union contracts.

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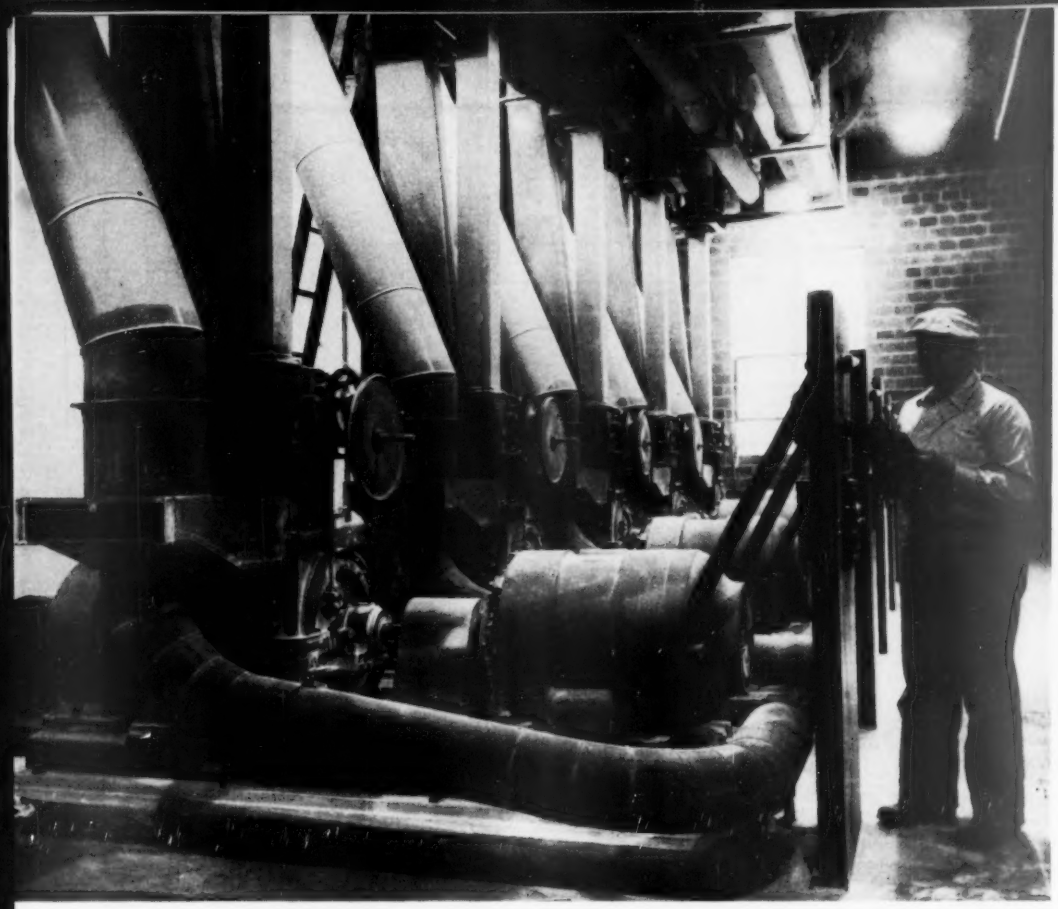


FED FROM ABOVE, HAMMER MILLS GRIND THE SOYBEAN MEAL AND IT IS FAN-BLOWN UP 40-FT. PIPE TO COLLECTOR

Good Handling Means Higher

Handling soybean meal is a difficult problem. This plant not only handles its materials efficiently, but also provides comfortable working conditions

AUTOMATIC MATERIALS HANDLING throughout its glue plant has enabled Monsanto Chemical Company, Seattle, Wash., to put production on a really efficient level—with less manpower under improved working conditions. An extensive ventilating and dust collecting system also makes the plant more pleasant to work in.

When Monsanto acquired the I. F. Laucks Company plant at Seattle five years ago, one of its first decisions was to replace the outmoded, 20-year-old frame building. Since expansion was desirable, a large tract of land was purchased between the Pacific Highway and the Duwamish River just south of the city limits. Shortly after the war, the company announced it would build a plant there, a unit at a time, beginning with one building for the production of soybean and casein glues.

The first unit of that project has now been completed at a cost of more than $1,000,000.

The plant is the biggest soybean glue operation in the world. Present production consists of 700 tons per month, operating five 8-hr. days a week.

Pneumatic Unloading System

The raw soybean meal arrives in carload lots of 40 or 50 tons and is unloaded at the rate of 20 tons an hour by the pneumatic unloader, powered by a 50-hp. motor. It goes into a recovery unit and thence by an under-floor screw conveyor to a bucket elevator rising 40 feet to the top of the six concrete storage bins, each holding 400 tons.

DRY GLUE IS MIXED AND WEIGHED AUTOMATICALLY

BAGS ARE PALLETIZED AND STORED, AWAIT SHIPMENT

Productivity, Better Product

Other conveyors take the meal to each bin, with loading continuing until the mounting pile touches a trip-arm at the end of the conveyor, setting off an alarm and stopping the unloading equipment. A louver at the upper end of each bin, opposite the point at which the meal enters, permits the entrance of fresh air, while a ventilator at the top draws off dust-laden air into a Draco dust collector. Meal gathered in this collector returns to a conveyor leading to the "daily-use" bin, fed principally by under-floor conveyors from each storage bin, loading a bucket elevator at the rate of 20,000 pounds an hour.

Simultaneous "tapping" of the six storage bins, with the conveyors at variable speeds, makes possible a high degree of uniformity.

The daily-use bin, of steel construction, has two indicators, one stopping the conveyors when its 20,000-lb. capacity has been reached, the other warning when the level has dropped too low. A ventilator leads to the dust collector.

Automatic Processing Equipment

From the daily-use bin, the meal passes through a magnetic separator which removes any metal scraps that might have been picked up in the boxcar, thence up a bucket elevator to a conveyor feeding five hammer mills. As capacity of the conveyor is greater than the combined capacity of the mills, excess meal is returned to the daily-use bin by a lower conveyor.

After the mills have ground the meal, a fan blows it from each mill 40 feet up a pipe to a collector above five sifters. The manufacturing process continues to its final stages in the same manner, with weighing and mixing accomplished automatically.

The finished dry glue then goes by conveyor to a bucket elevator, through a gyratory scalper which picks out any foreign matter, and on into two hoppers, from which it is released into bags at the rate of two bags a minute. The bags are placed on wooden pallets and stored by electric lift truck in the same building.

We Must Learn How to Manage

Every plant manager, says NAM's 1949 president, has two factories to run—the physical factory where men work to make a living, and the "phantom" factory where men work *to make a life.* Great are the rewards, he says, for those who manage both plants well—who provide the spiritual leadership so badly needed today

WALLACE F. BENNETT • PRESIDENT, BENNETT'S, SALT LAKE CITY; PRESIDENT, NATIONAL ASSOCIATION OF MANUFACTURERS

MANY AMERICANS HAVE BEGUN to lose their faith in freedom—their faith in the system that has made us great. That this should be so, in the face of the magnificent achievements of our nation, is a shocking thing to realize—and as puzzling as it is shocking.

If that overworked traveler, the Man from Mars, were to survey the world today and compare the fruits of our country, with its great spiritual heritage of freedom, with those of nations in which state authority and economic planning have displaced individual initiative and integrity, he surely would find it strange that anyone could lose confidence in a system so productive of widespread well-being.

Discovery of the Phantom Factory

Why should Americans begin to doubt their heritage? I believe I have found at least a partial answer. *It lies in what I think of as the "phantom factory."*

The discovery of the phantom factory has made clearer to me the challenge of spiritual leadership to the business management of America—and also the answers. I hope that all who manage and supervise in our industrial system will make this discovery—and realize that they are the managers of not one factory, but of two.

The phantom factory has many similarities to the actual one we know so familiarly. It occupies the same buildings, employs the same men and women, provides the same jobs. Its management and supervisory staff are the same.

But it has many differences. The physical plant we know so well turns out physical products. The phantom plant turns out—or tries to turn out—a spiritual product. Men work in the physical plant for a living. They work in the phantom factory *to make a life.*

The raw material each man brings to the phantom plant is the most precious thing in the world to him. It is himself. He brings all his mental, physical, and spiritual abilities; his hopes, his ambitions, his interests, and his dreams. Using the same experiences that he lives with when he works for his employer, he strives to turn out the most precious product in his whole life.

This product is an intangible thing—difficult, even impossible, to define—*a thing called happiness.* We can't quite define happiness because, although we all have the same basic objectives, its form is a little different for every one of us.

But we can agree that it is a spiritual experience, that it is elusive, and that the balance between success and failure in achieving it is very fine. If we are able to produce it in the phantom factory, it colors everything brightly that goes on around us. If we miss it, life at best is tedious and frustrating. At worst, life is poisoned, our judgment warped, every experience soured.

There is another thing about the phantom factory. We are not likely to have more than one chance. In the physical plant, if something is spoiled, the process can be corrected, straightened out. But there are not many chances to straighten out life if a man has got on the wrong track.

The process is basically this: Each man brings into his job the great human needs with which each of us was born. Out of the experiences he has, he attempts to turn them into satisfactions.

The processes of that spiritual plant of which we are also the managers, whether we realize it or not—because the two factories are inseparable—are the processes by which a man pursues happiness or heads toward failure.

Of the many great urges—the raw materials from which happiness is made—there are five related directly to industry. Obviously, happiness is pursued in places other than our factories. But there are five doors to which I think we in industry hold the key.

The first is *a man's need to be himself.* The second is *his need to grow.* The third is *his need to achieve and be recognized.* The fourth is *his need to belong.* The fifth is *his need to contribute.*

Can we manage our physical plants so that these great needs can be turned into satisfactions by the man working in his own phantom factory?

Our "Phantom Factories"

Wallace Foster Bennett started as a clerk with the family-owned business he heads today—Bennett Glass & Paint Company of Salt Lake City, now Bennett's. He is the author of a profit sharing plan for its 225 employees. He is also president of Bennett Motor Company (Ford distributor). Bennett's wide interests —he is officer or director of five other businesses— led to his election as a regional vice president of NAM. He moved up to the presidency last December.

Man's Need to Be Himself

No man can hope to be happy unless he can preserve his individual integrity. What can managers do to help him be himself?

We can make sure that he is a name and not a number; that we realize the things which make us individuals are the differences between us. Men must not be treated as though all were carbon copies of one another. We can recognize that men require self-reliance, and we can operate our plants so that that feeling is developed rather than destroyed.

Certainly a man can be himself only in an atmosphere of freedom; a slave has no individuality.

His Need to Grow

Have we the vision to recognize a man's ability, his interest in life, and to measure his potential so that we know how to help him grow?

People do not all want to grow in the same way. To some, growth means a different job in a different part of the plant. To others, it means promotion in the same department. And to still others, it means the opportunity to do a better job where they are, because they like their job.

Growing may often involve counsel, personal advice. Can they get it? And do we help employees find outside education if they want it? Do they have the chance to experiment or practice?

Finally, do we have the vision to match men's jobs to their growth, so that their very desire to grow is not stultified by the fact that their growth suddenly becomes sterile?

The influence of freedom is vital here, too. Without it, no man can grow to full stature.

His Need to Achieve

The thrill of achievement is probably the greatest incentive a man has. Mere recognition of achievement is in itself a great reward. Do we plan for that? Three situations must be set up. The employee must have the kind of job that challenges his best effort. He must have some kind of goal against which to measure himself. He must know how well he is doing.

There are three areas in which recognition is important. A man must be able to recognize for himself that he has accomplished something. Then, when a man's friends know that he has done something worth while, and recognize it, it brings a great warmth to that man. Finally, in every organization there is one man, usually the boss, whose recognition is the final accolade for achievement.

The same golden thread of freedom runs through the fabric of achievement and recognition. Any achievement by a man who is not free is a mockery.

His Need to Belong

The fourth basic human urge is the need to belong. All of us want to be wanted. We want to be accepted. We want to be understood and appreciated. The feeling of being excluded, shut out, is about as miserable as any we can experience.

It is essential that we operate our plants so that men have the deep satisfaction, the quiet joy, of being wanted, understood, and appreciated.

There is another area of this problem, even bigger and more important. In order to feel that one belongs to an organization, one must understand how it operates, and what is the part of every person in it.

Few operations, if any, in the modern factory are

not vital. Shut down one department, even one machine, and sooner or later the whole plant would shut down, in most cases. Therefore, every man's work is an indispensable factor of production.

But how many employers or supervisors ever take the trouble to tell these men and women just where their situation fits into the whole; to give them the thrill that comes to a man playing on the team who knows that even though what he does seems unspectacular, it is vital?

Take a football team. The lineman knows he is going to take a beating, Saturday after Saturday, and that it is the quarterback who will get his picture in the paper. But he knows also that the quarterback and the rest of the team, and the coach and his friends in the stands, fully realize what he contributes. And he knows how heavily they depend upon him.

Many of our people are linemen. Do we tell them enough about our business, and their place in it, so that they feel they belong on the team? Again, of course, there is no satisfaction in belonging unless there is freedom here, too. A man likes to pick his own friends.

His Need to Contribute

The fifth need—difficult to define and discuss—is the great need a man has to contribute.

Sooner or later, we all come to realize that we are the heirs of a great heritage—perhaps not so much the heirs as the trustees. Each of us feels that he must give something of himself to that vast capital, spiritual and material, which has come down to us in America. It must be something without a price tag—something over and above what is expected of us.

Here, as in other areas, managers can inspire, set an example, and encourage. We can accept offers to make a contribution when they come to us. Again, freedom is vital here, because only a free man can make a gift of himself.

Greatest Powerhouse in Industry

I suppose a good many employers and managers will say to all this: "It is very pretty. It is nice philosophy. But we are running a business. We have no time for that kind of thing."

The answer I would make is that managers cannot afford to ignore it. Part of the trouble existing in the world today is due to the fact that these phantom factories of ours are not operating properly. Men are not turning out the right products in them. Therefore, in their disappiontment and frustration, they yield to fears about the operation of our physical plants. They give way to dissatisfaction, to mistrust, and to misunderstanding. The result is industrial unrest.

On the other hand, when managers have the spiritual capacity so to manage the physical plant that they can bring the phantom factory in tune with it, they open up for themselves the greatest powerhouse in industry.

When these five sources of human aspiration are properly developed, their impact is far from intangible. Anyone who can unleash the powers of individuality, imagination, and initiative must realize their force. Anybody who can see a man grow on the job, and who has the ability to give all men a chance to grow, can see his company grow. Any man who has the vision to realize that the achievement of the company is measured as the sum of the achievements of the men and women who work for it, will realize how vital a force that can be.

All of us who work in industry have felt the value of loyalty, the great understanding influence that comes when men are loyal regardless of pressure. And a man's opportunity, a man's willingness to make a contribution, is the key that opens all other portals. You cannot buy this powerhouse. You cannot command it. You have to earn it as a successful manager of the phantom factory.

Biggest Reward of All

There are many financial rewards for those who can manage the phantom factory successfully. But there is another, far more important reward.

The great problem in America today is to help people regain their faith in freedom. In trying to describe the processes by which men find happiness in their jobs, I suggested that freedom is the golden thread that runs through each of them.

Freedom has been defined in many ways. But we can be sure that freedom is not merely a condition created by a law, enjoyed in some vague way on a national basis, and celebrated on holidays. Freedom is a spiritual experience. Either a man feels free—or he is not free.

For another thing, I have come to believe that freedom is not an end. We talk about defending freedom—but freedom itself is not an objective. Freedom is the means. The end, for all of us, is this elusive thing we call happiness.

If those of us in management operate the plants over which we temporarily have control—both the physical and the phantom plants—so that in that area for which we are responsible freedom exists and lives, then the men and women who work in that area with us will believe in it and trust in it. In that area, at least, freedom is safe, and lives.

I would like to observe, however, that we cannot say freedom is safe for America and for the world, even though we are in an area where freedom is safe. Only in that expression of freedom which we call freedom of enterprise, or the free, individual competitive economy, can we continue to build the dynamic, expanding economy which has made our country great and all our lives spiritually and materially richer.

Many of us have been looking for freedom where it does not exist—the great national areas. It was thought that freedom must be saved by battles over rules. It was not fully realized that the solution lies where it always has been, right in our own hands and in our own hearts.

The Challenge of Spiritual Leadership

The great challenge of today is the challenge of spiritual leadership. The task before us, in responding to the challenge, cannot be encompassed by any master blueprint. The job belongs to individual managers.

I believe the American people are ready to follow those who will lead them again in the old traditional spirit of freedom and individual integrity. I hope that, throughout American industry, we have men who can rise to that challenge and devote themselves to the great task of managing our phantom factories as well as they manage our physical ones—in spiritual leadership.

WIRE BASKETS hung from ceiling protect workers' clothes from dampness and mildew where climate is hot and humid. To avoid contamination, each worker is assigned two baskets, one for fresh and one for dirty clothes

CLOTHING baskets are raised and lowered by metal sash chains attached to locker room's side wall

Suspended Baskets Keep Clothes Dry

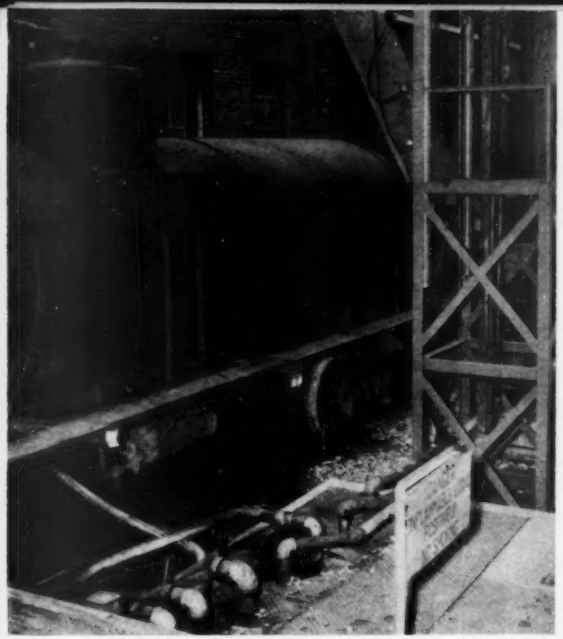
DIAMOND ALKALI COMPANY, at its new caustic soda and chlorine plant near Houston, Tex., has a change room for the plant workmen which features the use of suspended clothing baskets of steel wire mesh. They were designed as a means of obtaining maximum ventilation.

The main consideration leading to the use of baskets was the excessive humidity and warmth prevalent along the Gulf Coast during the summer months. This condition favors the slow drying of clothing damp with perspiration or rain and the development of mildew. It was decided that these difficulties could best be avoided by assigning each employee a basket into which clothing could be placed or from which apparel could be suspended by hooks attached at the bottom, the basket then being raised against the ceiling of the change room by a chain.

The baskets are of galvanized steel wire mesh and are 14 inches in diameter at the top and 12 inches at the bottom. The depth is 6½ inches. From the bottom of each basket hang four heavy hooks from which bulky clothing may be suspended. The 360 baskets are spaced on 18-in. centers. Each employee is provided with two, in order to eliminate any possibility of contamination of fresh clothing with wet or sweaty clothing.

Except at change time the baskets are kept suspended near the ceiling by No. 35 galvanized sash chains passing through pulleys and fastened at the lower ends by staples fixed on one wall of the room. The pulley supporting each basket in position is attached to a hook bolted through a 4-in. steel channel, which in turn is tack welded to rows of bar joists fabricated from ¾-in. round bars. These joists are suspended from 6-in. I-beams supporting the concrete slab roof.

The baskets are in a change room located in the personnel building. The room measures 60x49 feet, with a height of 21 feet. Walls are of concrete block protected with moisture resistant paint. The room is divided into halves by a fire-retardant wall constructed of brick for the first seven feet from the concrete floor and asbestos board from the top of the brick to the ceiling. Twenty metal sash windows permit free entry of fresh air in the room. The air is circulated and evacuated by means of large exhaust fans.



UNLOADING STATION HAS SAFETY PLATFORM TO CAR

PUMPHOUSE CONTAINS SEPARATE PUMPING EQUIPMENT

Bulk Handling of Liquids Saves

While looking for savings in handling of liquids shipped in small containers, Wagner discovered big savings in materials costs by buying in large quantities

R. H. HACKETT • PLANT ENGINEER, WAGNER ELECTRIC CORPORATION, ST. LOUIS

INSTALLATION of an efficient tank storage and pipeline system for unloading bulk industrial liquids and distributing them to its manufacturing processes has paid for itself in two years.

Prior to this, most of these liquids were bought in smaller lots, because of limited storage capacity, and distributed by electric and hand trucks to the plant in drum containers. The new bulk system is saving better than $2400 yearly in handling costs. And by permitting purchase of liquids in tank car lots it effects a reduction, now averaging 13 per cent, in their cost. What the latter saving alone means can be inferred from an annual consumption of over one million gallons of bulk process liquids.

Nine liquids, excluding transformer oils and fuel oils which are handled somewhat similarly by separate systems, are involved. Some are flammable, such as naphtha, kerosene, diacetone, and cleaning fluid. The others are nonhazardous, such as red engine oil, cutting oil, castor oil, hydraulic oil, and mineral seal oil.

Each liquid has its own piping system. From the tank car unloading station these nine systems run in a single concrete tunnel to a pumphouse some 85 feet away. From here pipes run back in this same tunnel and branch out to each of nine storage tanks adjacent to the pumphouse, in runs of 30 to 110 feet. Also from here, distribution pipes run to the various points of liquid consumption in the plant, at distances varying from 150 to 750 feet.

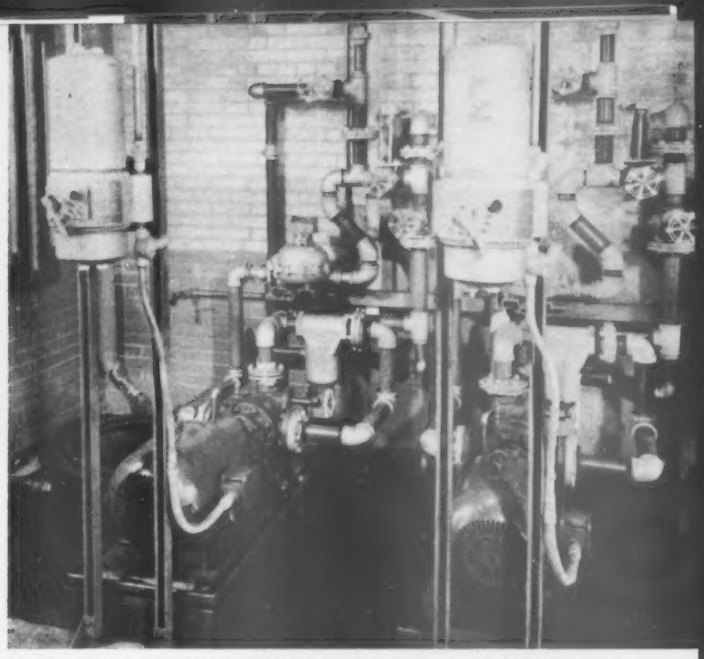
Design and operation of each of the nine units of the system are similar. Flow of liquids is controlled at the pumphouse, which is a single-story reinforced concrete building 30x40 feet in size. Here are located the pump, valves, meter, and other dispensing equipment for each unit. All pipelines, valves, and equipment throughout the system are painted in distinctive color code for positive identification of each liquid. In addition, each valve wheel carries a metal strip bearing the name of the liquid it controls, and a valve number.

Safety Precautions

Storage tanks are all of 11,500-gal. capacity. Those holding flammable liquids were placed underground. Large pits were dug, the tanks were anchored to concrete footings and then covered over with dirt. The other tanks were mounted aboveground on reinforced concrete slab platforms.

Wherever underground tunnels

FOR HANDLING EACH BULK LIQUID



EACH PUMPING UNIT HAS EXPLOSION-PROOF MOTOR, STRAINER, AND METER

Cost of System in Two Years

are used for pipelines, they are mechanically ventilated to prevent accumulation of vapors. Openings made of removable steel grating are located at intervals for easier servicing of piping.

All hose connections used throughout all lines of the entire system are grounded to eliminate static electricity hazards. Pumps, motors, starting equipment, and pumphouse lights are of the explosion-proof type. Pressure-release valves on pipelines carrying volatile liquids are located in the pumphouse.

As each tank car arrives it is spotted at the unloading station of the railroad siding. Here are located the numbered inlets of the nine pipelines. The incoming car is connected by a flexible hose and coupling to the proper inlet, and by proper manipulation of the valves in the pumphouse the liquid is pumped into the company's storage tank. All flammable liquids are drawn out of the top of the car to eliminate the hazard of spillage. Nonhazardous liquids are drawn from the bottom of the car.

To facilitate making top unloading connections, a special counterpoised lifting platform was provided on which the attendant can stand in safety in all kinds of weather. It, too, is electrically grounded. The open end of the platform can be let down until it rests on the tank frame, no matter what the height of the car.

Metering

The amounts of all receipts and disbursements of all liquids are recorded by a volumetric meter located in each pipeline in the pumphouse. This meter has two readings —one acts as a totalizer, and the other can be reset to zero starting point to measure single amounts received or distributed. The motor can never be bypassed.

There are three methods of distribution of liquids from each of the large storage tanks. All methods involve use of the same pump, meter, and valve arrangement as was used for unloading. The valves must be pre-set for whatever method is wanted.

More than three-fourths of the volume of liquids stored is disbursed to points of consumption in the plant through the distribution pipelines. The remainder is dispensed in drum lots, or less than drum lots, right at the pumphouse. For the latter purposes, all units are arranged to discharge into individual hose dispensers mounted in a group at one point on the floor where a recessed platform scale has been installed. The scale is used whenever exact quantities by weight are to be dispensed.

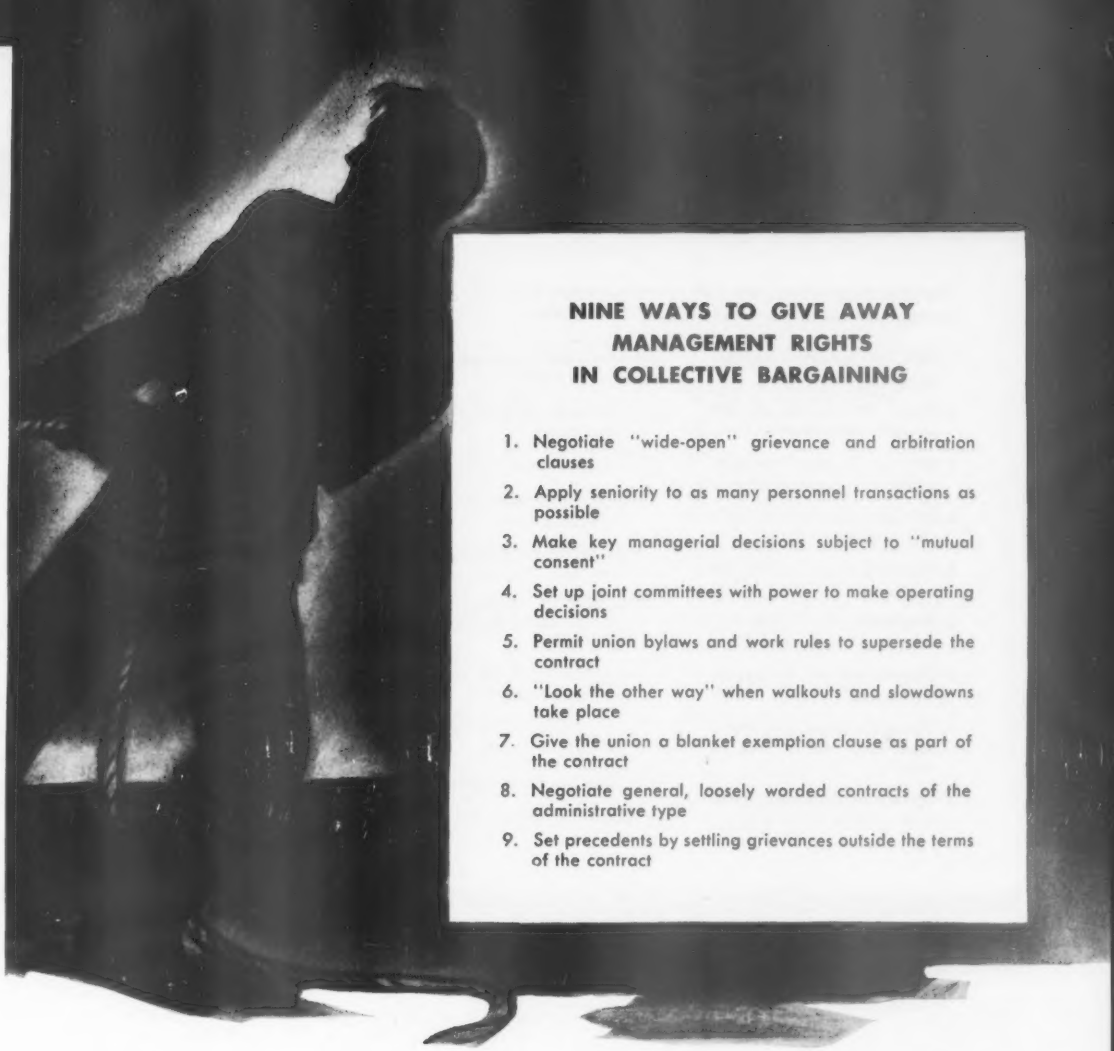
In addition, four of the liquids (red engine oil, cutting oil, naphtha, and kerosene) can be pumped into 400-gal. sub-storage tanks buried in vaults below the concrete floor. Liquids are dispensed from these sub-storage tanks by hand-operated pumps located on the floor directly over the tanks.

So that there will be no mistake in the valve settings required for all operations, printed instructions are mounted on the wall of the pumphouse. These instructions specify by valve number which valves are to be open and which valves are to be closed when unloading any of the nine liquids or distributing them to the available outlets.

Who's Going to Manage

It will be the union—if you don't watch out. . . . Many a plant, through seemingly innocent clauses in its contract, has already, knowingly or unknowingly, bargained away control over important managerial functions.

Also, labor leaders are putting the pressure on legislators as a short-cut to greater power. In big government and big union they see their greatest chance for success in a game where the stakes are high—so high that no holds are going to be barred in labor's drive to win.



NINE WAYS TO GIVE AWAY MANAGEMENT RIGHTS IN COLLECTIVE BARGAINING

1. Negotiate "wide-open" grievance and arbitration clauses
2. Apply seniority to as many personnel transactions as possible
3. Make key managerial decisions subject to "mutual consent"
4. Set up joint committees with power to make operating decisions
5. Permit union bylaws and work rules to supersede the contract
6. "Look the other way" when walkouts and slowdowns take place
7. Give the union a blanket exemption clause as part of the contract
8. Negotiate general, loosely worded contracts of the administrative type
9. Set precedents by settling grievances outside the terms of the contract

—You or the Union?

THERE IS GOING TO BE a managerial revolution in the United States if organized labor can bring it about. The revolution will take the form of drastic restriction and redefinition of the rights of management.

This is a strong statement, but the signs are so clear that there is no denying it. Labor has never made any secret of its conviction that there are few, if any, functions of management that are sacred from attack.

Labor's effort to win more of a voice in the management of industry and in the direction of its policies is an old story. So is management's opposition to most of these objectives. Because that opposition has not been strong enough, the matter is now urgent. It is particularly urgent because labor's collective bargaining efforts are being more and more effectively supplemented by vigorous political activity.

On the collective bargaining front, the scope of bargaining and the power of labor have increased over the years because of (1) decisions of the National Labor Relations Board; (2) activities and examples of labor monopoly unions; (3) specific concessions by management during or after collective bargaining negotiations.

Decisions of the NLRB. Since 1935 the NLRB has been playing an important part in defining the legal

If You Say "No" to Too Many of These Questions

To what degree are you free to exercise the key managerial functions listed below? CAN YOU...

1. Hire anyone you consider competent?
2. Reject anyone you do not consider competent?
3. Put new workers "on probation," as necessary?
4. Put new workers on any job where needed?
5. Promote most competent workers?
6. Promote workers to jobs outside the bargaining unit?
7. Demote workers who are incompetent?
8. Reclassify workers to lower paid jobs due to lack of work?
9. Transfer workers laterally to jobs at same rate of pay?
10. Discipline incompetent or lazy workers?
11. Discipline workers violating shop rules?
12. Discharge workers for cause?
13. Discipline workers for quickie strikes?
14. Discipline workers for slowdowns?
15. Discipline union officials and stewards for violations of rules?
16. Establish rules of personal conduct in shop?
17. Change rules of personal conduct in shop?
18. Establish safety rules?
19. Change safety rules?
20. Evaluate jobs?
21. Set rates of pay for new or re-valuated jobs?
22. Change job descriptions as work changes?
23. Evaluate workers by means of merit rating?
24. Give workers tests to check competence or aptitudes?
25. Use test results to promote or transfer workers?
26. Employ trainees or apprentices?
27. Schedule production?
28. Schedule temporary layoffs?
29. Schedule permanent layoffs?
30. Schedule overtime?

subject matter of collective bargaining. Every subject that the board lists as a bargaining "must" is another subject that is no longer legally the sole prerogative of management. Thus the NLRB ruling that refusal to bargain over merit increases, pensions, and insurance plans is an unfair labor practice, narrows the legal area of management rights by another notch.

Labor monopoly unions. On July 5, John L. Lewis began his own personal program of production control for the bituminous coal industry by ordering some 450,000 miners to work only three days a week. The fact that the mine owners had refused to shorten the work week during collective bargaining made no difference to Lewis.

That the union leader in this industry was able to make a radical decision for the whole of management—and in spite of opposition—is vivid evidence of the power of a labor monopoly. Under monopoly conditions the union need not worry about negotiating away management's rights. The blind and unquestioning obedience of the work force makes it possible for the union to step in and exert economic pressure to get what it wants.

Other monopoly unions exercise even greater powers, and have taken greater interest in direct participation in many managerial functions. The Amalgamated Clothing Workers (CIO), for example, won't let you start a new plant without its consent. And if you are a contractor in the clothing industry, you don't set the prices you will charge. The union does this for you. It also tells you what profit you can earn and what your overhead should be. And it makes you tell the names of the manufacturers you do business with and the grades and prices of all the garments you sell.

Specific bargaining concessions. Innumerable opportunities exist for giving up management rights in collective bargaining negotiations or in living under the contract, once it has been signed. Here, in fact, is the area where many employers have hurt themselves the most. At some time or other some employer has bargained away control over virtually every function of the business. Sometimes this has been done directly and with full understanding of what is going on. More often, however, apparently innocent clauses have been agreed upon which later turned out to be packed with dynamite. It is these "dynamite" concessions that must be watched for. In the hands of irresponsible, short-sighted union leaders they can cause management untold harm.

You Are Not Really Managing Your Plant

31. Schedule times when vacations will be taken?
32. Make time studies?
33. Set production standards?
34. Establish incentives to increase production?
35. Change methods of work?
36. Change plant layout?
37. Set up new departments?
38. Set up new plants?
39. Change products to be manufactured?
40. Introduce new products for manufacture?
41. Introduce new equipment and machines?
42. Sub-contract work to outside firms?
43. Use nonunion-made materials or parts?
44. Use nonunion-operated outside transportation facilities?
45. Use nonunion-operated outside service facilities?
46. Retain supervisors or executives on payroll?
47. Make foreman or supervisory appointments?
48. Train rank and file candidates for foremanship?
49. Give physical examinations at time of hire?
50. Give periodic physical reexaminations?
51 Approve notices for posting?
52. Approve notices or pamphlets for distribution within plant?
53. Initiate grievances against the union?
54. Hold meetings of workers?
55. Settle grievances directly with workers?
56. Retire workers at standard retirement age?
57 Set prices of products?
58. Determine dividends?
59. Borrow funds for business needs?
60. Advertise company's products or services?
61. Distribute or sell company's products or services?
62. Sell or transfer ownership of the plant?
63. Engage in competition with other firms?
64. Set standards and procedures for quality control?
65. Determine credit policies?
66. Determine desired margin of profit?

HOW RIGHTS CAN BE BARGAINED AWAY

Here are nine ways—most of them seemingly harmless—in which an employer can give away management rights in collective bargaining:

1. *Management's rights can be given away by negotiating "wide-open" grievance and arbitration clauses.* The worst possible combination of provisions regarding grievances and arbitration is one that resembles the following:

"In the event that any difference should arise between the company and the union, the following procedure shall apply . . ." (preface to multi-step grievance procedure), and

"Any complaint not settled in the foregoing grievance procedure shall be referred to arbitration . . ."

By allowing *any* differences between labor and management to go through the grievance procedure and into arbitration, these two simple clauses open up *every* management decision to union attack. The arbitrator would be justified in ruling against management (if he saw fit) on such matters as scheduling of production, setting of standards, prices charged for products, company profits, and even the disciplining of the president of the firm. As a matter of fact, all of the above and many other supposedly secure management rights have gone to arbitration under wide-open clauses.

2. *Management's rights can be given away by applying seniority to as many personnel transactions as possible.* Here is a sure-fire method of getting into plenty of trouble. Commonly applied where layoffs due to lack of work are necessary, seniority can also spread to practically every other type of personnel transaction. This is a big issue with many unions. As a result, seniority has been made the key factor in promotions, demotions, transfers from job to job and from shift to shift, assignment of overtime, length and time of vacations, and even the selection of supervisors.

Once seniority is firmly entrenched, managerial control of the functions affected becomes a joke. The inflexible rule that only length of service can be considered in making personnel changes leaves no room for managerial discretion.

3. *Management's rights can be given away by making key managerial decisions subject to "mutual con-*

sent." In the heat of bargaining it may easily seem a simple way out of long arguments to agree that disciplinary action or production standards or other key matters shall be settled on a basis "mutually agreeable to the company and the union." The company negotiator may reason that this is safe because he can always refuse to give his consent. What is all too easy to forget is the fact that *the union can do the very same thing.* Moreover, that is exactly what has happened in many cases. So—nothing gets done. Discipline, efficiency, and productivity go to pot.

No matter how attractive they may sound, mutual-consent clauses are bargaining booby traps. A good example is the recent Ford strike, where the contract provided for mutual-consent arbitration of disputes over production standards. The clause was obviously for the protection of management, but it was the union that refused to arbitrate the dispute in question, with the result that a long and costly strike was precipitated.

4. *Management's rights can be given away by setting up joint committees with power to make operating decisions.* Where joint labor-management committees are designed mainly to keep the union informed or to give the union the chance to advise and consult with management, the system fulfills a worthwhile function. Even then, it often happens that the committee gradually gets around to making decisions instead of recommendations. When this happens, whether by specific negotiation or by common practice over a period of time, it means that managerial control is diluted.

The results may often be good—how good will depend in large measure on the attitudes and abilities of the union members of the committees. But here is something beyond management's control, and it highlights the biggest hazard of joint committee plans. The most common union procedure is to strive for contract provisions calling for joint job evaluation or joint production standards committees. The pricing of jobs, classification of workers, and determination of what amounts to a fair day's work are key factors in any company's cost picture. To share these functions directly and on a day-to-day basis with the union is at best a dangerous undertaking.

5. *Management's rights can be given away by permitting union by-laws and work rules to supersede the contract.* The International Typographical Union (AFL) is the classic example of union insistence on a blanket write-in of its by-laws as a formal part of the labor agreement. Where this is allowed to happen, it means that the union's rules supersede the company's. On all matters covered by its by-laws, the union has usurped the role of management.

In other cases, unions do not insist on writing their rules into the agreement. They simply impose them on management, refusing to work otherwise. It is by such means that many craft unions manage to perpetuate their featherbedding practices. It is also by such means that many managements give up important areas of control over their businesses.

6. *Management's rights can be given away by "looking the other way" when walkouts and slowdowns take place.* Quickie strikes and slowdowns are useful as intimidation devices when a union wants its own way in spite of lack of contractual rights. They are a key part of winning disputes by pressure on line supervision. Aimed at convincing supervisors that contemplated discipline or changes in conditions or personnel will cause more trouble than they are worth, such tactics are often successful. In practice, they make the decisions for management.

7. *Management's rights can be given away by giving the union a blanket exemption clause as part of the contract.* The most common type of blanket exemption is a contract without a "no-strike, no-slowdown" clause. Then the union can legally stop work at any time, in protest against anything that does not meet with its approval.

Because of his labor monopoly position, John L. Lewis has been able to go one step further in the direction of blanket exemption from the terms of the labor agreement he signed, presumably in good faith. The contract provides that the miners shall work only so long as they are "able and willing." Here again, the phrasing of the exemption means, in effect, that no managerial decision by the mine owners need necessarily be binding on the mine workers if they decide (through Lewis) that they do not agree.

8. *Management's rights can be given away by negotiating general, loosely worded contracts of the administrative type.* An administrative agreement is one that does not clearly and precisely define the rights and responsibilities of labor and management. It is usually short, and leaves much of the relationship between the parties up in the air, subject to day-to-day working out as problems arise.

Any union that is really anxious to move in on management's rights and gain at least joint control of the operation of the business would welcome an administrative agreement as the ideal mechanism.

It is regrettable that the administrative type of agreement faces this problem. Where the circumstances are just right, there is no doubt that such agreements can be of real value. Let us be practical, however, and recognize the fact that present conditions in this country make the administrative agreement hazardous for the average employer. Led by ambitious spokesmen, unions are aggressively on the move toward greater power. It is therefore important to insist on well-phrased, detailed contracts.

9. *Management's rights can be given away by settling grievances outside the terms of the contract.* Here is one of the worst collective bargaining pitfalls into which management may stumble. In living under the contract, every employer finds many occasions when it seems only the fair thing to go beyond the terms of the agreement in settling a problem. If not policed, the same idea will often occur to many different people in the supervisory and executive groups. Out of the numerous unofficial extensions of the contract so brought about, precedents are readily established that make the negotiation of succeeding agreements far more difficult.

A further hazard in extra-contractual settlements of grievances is the fact that they amount to a constant process of redefining management's prerogatives. The end-result is that uncertainty arises as to where and how the union may intervene. This unnecessarily complicates the task of keeping both union and management representatives informed of their proper functions and areas of authority.

HOW RIGHTS CAN BE USURPED BY POLITICAL ACTION

The gradual whittling away of managerial control through collective bargaining is a long and tedious job. Why do it the hard way when there is a simpler alternative? So argue the unions. The alternative is to use intensified political activity and pressure on state and federal legislators as a short-cut to greater power. By systematically pressing for big government and big unionism, labor leaders see their greatest chance for success in a game where the stakes are high.

So far the attack has been scattered. There has, of course, been violent and unremitting opposition to the Taft-Hartley Act, which will continue and will provide the base for a major test of labor's political strength in the 1950 elections. In the meantime, many other legislative objectives are very much in the picture. Among them are support of legislation aiming at increased minimum wages, price control, allocations of materials and setting of production quotas in key industries, higher taxes on corporations, tighter control over business monopolies, redefinition of corporations under federal charter. Also, support is being given to the many administration proposals for health and welfare benefits on a national scale, and to a great variety of projects involving expansion of governmental control into areas of education, safety, housing, rents, natural resources, and foreign and domestic commerce.

All are evidences of the extremely broad interests of the leaders of labor-in-politics The most important indicator of the direction and form of labor's thinking about the future has not yet been pressed seriously on the political front. That is Philip Murray's British importation: the "Production Council Plan." The plan is particularly important because the CIO's bright ideas of today are so often the present administration's brain-children of tomorrow.

The CIO plan bears the impressive label of "nationwide democratic industrial planning." Key point is the formation of industry councils which would exercise most of the important policy and decision-making functions now handled by management as sole or major prerogatives.

Every industry would have its own council, composed of representatives of organized labor, management, government, and the ultimate consumer (where possible). These councils would run the industrial affairs of the country. They would deal with such matters as production and employment levels, foreign trade, prices, wages, natural resources, and size and locations of plants. Binding decisions would be made, and presumably there would be some means for bringing recalcitrants into line.

Above the individual industry councils there would be a super-council to run the entire economy. Called the National Production Board, this body would be composed of representatives of organized labor, management, government, farmers, and consumers. Industry, in other words, would apparently have about a 20 per cent vote in the making of top-policy decisions affecting its welfare.

The entire CIO plan is dedicated to the British labor government principle of "national planning" and rigorous control of the key activities of the whole nation. Walter Reuther, in advocating this kind of planning, points out that there is a major conflict in this country between two types of planning. He says:

"It is privately planned economic scarcity by companies for profits or publicly planned economic abundance for the people. That is really the struggle. I say the challenge can be met.

"We have to build a broad coalition of labor and farmers in America, and weld a joint political and economic program. With a program that makes sense, these forces, welded together in America, can be the architects of tomorrow."

In contrast to the national-planning blueprint that CIO advocates, AFL's position is far less planful, puts greater emphasis upon local joint action. The desire for greater participation in management planning and decision-making is evident, but the means of achieving this goal is set in terms of the bargaining relationship between the parties rather than in terms of a special edition of British national socialism. AFL and CIO certainly differ as to means, but they appear to be in substantial agreement on the ends to be achieved —i.e., more to say about how industry operates, plus greater political power and prestige.

★ ★ ★

Is organized labor going to be strong enough to put its ideas across? Labor is stronger now than ever before. It probably will continue to grow stronger, barring a major depression. It cannot fail to achieve its goal if it continues to have the blind and almost unreasoning loyalty and support that has been displayed by key members of the present national administration.

To its powerful emphasis on "big government" as the answer to most of the nation's problems, the administration couples an unyielding pro-labor viewpoint which promises a rich union harvest in the next few years unless it is checked by well-directed, intelligent management action. (*What form that action may take is described in an article scheduled for early publication.*—ED.)

SCHEDULE BOARD is made up by placing metal clips, which hold card listing material required, in appropriate position by date and machine. Blank clips denote successive days required for order to be completed

Schedule Board Insures Delivery Months in Advance

WALTER A. FRAZEE • VICE PRESIDENT IN CHARGE OF PRODUCTION, STEEL IMPROVEMENT & FORGE COMPANY, CLEVELAND

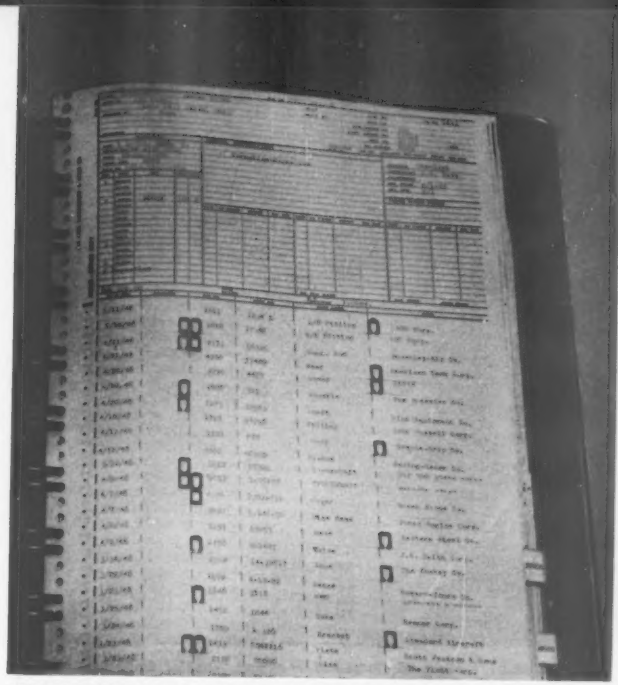
REVISING SCHEDULES and meeting delivery promises made months in advance presents no problem at the Cleveland plant of the Steel Improvement & Forge Company. Reason: An elaborate-looking but simple-to-operate scheduling board.

As orders are received, schedule cards are made out and placed in a loose-leaf book (photograph, right). Following this, small scheduling cards are made out, and the order is scheduled on the board (photograph, left). Each clip represents one day's production on any one piece of equipment.

PRODUCTION SCHEDULE provides firm list of orders for coming week, is issued each Thursday. Advance schedule for succeeding week gives warning to prepare stock, inspect material, and ready dies

FORGE SHOP PRODUCTION SCHEDULE

			DAY ▶	Fri.	Sat.	Mon.	Tues	Wed.	Thurs.	Fri.	Sat.	ADVANCE SCHEDULE					
			DATE ▶	4/16	4/17	4/19	4/20	4/21	4/22	4/23	4/24						
Size Hammer	No.	L.S.		Die No.	Die No.	Die No.	Die No.	Die No.	Die No.	Die No.	Die No.	4/26	4/27	4/28	4/29	4/30	5/3
1" UP AJAX	1			STEEL 1817		STEEL 1817	4889	4889	4889	4889		3 ord. 1814	1814	2 ord. 1-Steel 4163	4163	4889	4889
3½" UP AJAX	13																
1000 B ERIE	7	★		4685		1234 4888	4888	4888	4888	4888		1642 4665	RUN 2 4769	DIES 4769	4769	4769	4769
1200 B ERIE	5	★															



ORDER BOOK contains schedule cards filed by first operation. Tickler system indicates availability of steel and dies that will be needed for processing

Revising schedules is a matter of minutes. Tickler system on orders in loose-leaf binder virtually guarantees freedom from normal production delays

Equipment is scheduled to 70 per cent of capacity, leaving allowance for breakdown as a factor of safety. Where an order will take more than one day's production on any piece of equipment, sufficient additional blank clips are added to the right of the order clip to indicate the total time that will be consumed by the particular order.

Many jobs require consecutive blocking and finishing operations on various sizes of hammers. It is possible to see at a glance how these consecutive operations may be worked into the schedule. This is done by placing the first operation on the board under its proper hammer, then moving down the board to the hammer that will perform the second operation to see how long an interval will have to elapse before the second operation can be started.

Sometimes customers must have their material in advance of the originally scheduled date, and occasionally conditions arise which necessitate moving an order back in delivery. The board setup is ideal for seeing how the schedule will be affected by the required change. In fact, an entire schedule can be torn to pieces in a matter of minutes and orders rescheduled with the new sequence automatically lining itself up and showing open spots.

Order Schedule Book

After the order schedule card has been made out it is placed in the order schedule book in the section set aside for the particular piece of equipment that is going to perform the first operation. The sequence of this order in the book is identical with the sequence on the schedule board. As the order moves up to within a month of actual production, orders for new dies or repairs of old ones are issued. In addition, orders for steel are placed with prime suppliers, and commitments for company-furnished material are verified with the manufacturer.

Green clips attached to the card in the priority column (second from left) indicate that no steel is available. Red clips in the next column (die number) indicate that dies are not ready. Black clips in the column marked "firm" (far right) are put on when the order has been released to the shop.

Additional Advantages

The efficiency of the scheduling board does not cease here. As an order moves up to within two weeks of actual production it is entered on a shop production schedule. These schedules are made up every Thursday, and include material on order for the balance of the current week, orders which are expected to be produced the following week, plus a tentative advance schedule for the week after. The schedule of orders for the latter part of the current week is included to make certain that no carry-over material is overlooked.

This production schedule is actually made up by merely copying the information from the tickets on the scheduling board in exactly the sequence in which it occurs on the board. In this way, all material on the board is bound to get into the schedule. Prior to issuance of the schedule, steel inventory and deliveries are checked once again for orders to be produced during the following week.

The advance tentative schedule gives the stockroom a chance to have the proper stock prepared by sawing or grinding. It allows time to see that physical and chemical checks have been taken. In cases involving government inspection (where material may have been received without inspection and must be inspected before going into production) it allows time to get such matters taken care of. Further, it gives the tool-and-die man a chance to verify the status of his die orders for these tentatively scheduled orders.

Shipment promises six to eight months in advance with a reasonable assurance of delivery are possible with the new schedule board. When customers supply the lead time that they require for machining of the forgings, it is possible to build back from this time to guarantee delivery on a schedule that will allow each subsequent operation at customer's plant to be met.

FIRE-FIGHTING TECHNIQUES were demonstrated to the plant protection officers to supplement classroom study of classes of fires and types of equipment needed to stop them. Morale was improved and safety increased

Gets Plus Values by Training

Improved public and employee relations result from intensive training and a comprehensive manual for Post Cereals' staff of plant protection officers

W. S. WHEELER • FIELD EDITOR, FACTORY, CHICAGO

THERE IS A decided difference between the present polite, efficient "plant protection officer" and the former rounds-trudging "watchman" at the Post Cereals Division plant of the General Foods Corporation in Battle Creek, Michigan. He's the same man in identity, but much improved in ability, attitude, and resourcefulness. The reason—a training program.

This program was started because management felt that the service potential of its watchman's staff was not being fully explored. It wanted the old, limited conception of duties—punching the station clocks, admitting employees and visitors, and submitting the usual routine reports—to be revitalized and enlarged.

According to company policy, every training program in the plant has to justify its origin by an affirmative answer to the following question:

"Will this training effort reduce costs, increase production, and lighten the burden on supervision?" The program has done these things, even though a service function and not a manufacturing function was involved.

Once shown feasible, the program was begun by listing the following objectives:

1. To develop an understanding by plant protection officers of the important role they fill in the area of public relations.

2. To give each officer a chance to discuss fully his various duties and responsibilities.

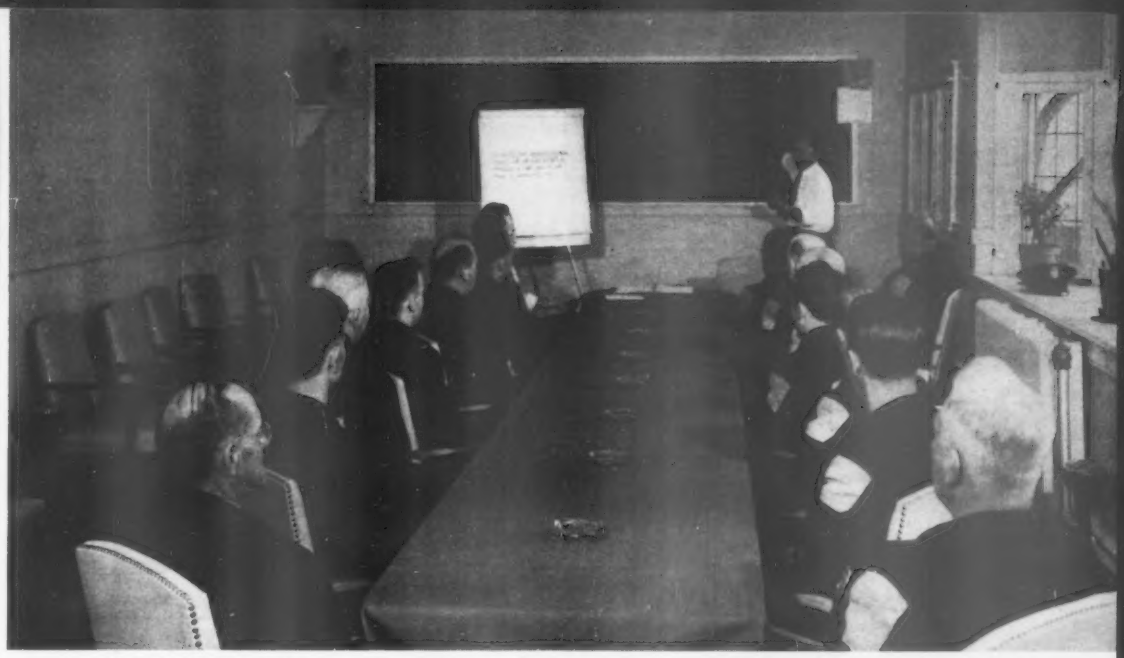
3. To impress on each man that his department is a service group having a staff function in the whole plant organization.

4. To eradicate any ideas that an officer's job is purely a police job.

5. To instill a personal conviction in each officer that the plant protection department exists for the over-all benefit of employees and company.

Those who took part in designing and developing the program were the plant engineer, personnel manager, assistant plant engineer, supervisor of plant protection and transportation, plant protection chief, two foremen of the plant protection department, and the coordinator of training and development. Some 32 plant protection officers were involved.

Preceding the actual training procedures, the program called for a change in name and dress. "Plant protection officer" superseded "watchman," and regulation blue



TRAINING SESSIONS for plant protection officers used the directed-conference method. Ten sessions of 1¼ hours each were led by qualified supervisors, aided by charts, rule booklets, and case-example worksheets

Plant Protection Staff

serge uniforms replaced ordinary work clothing.

The training course itself was built around six basic subjects: (1) organization structure of the plant protection department; (2) duties and responsibilities of the officer; (3) public relations part of the officer's job; (4) how to report the facts; (5) plant sanitation; and (6) fire prevention and control. Ten training sessions of 1¼ hours each were held. Units (1) and (5) each took one session, and all the others two sessions each.

The directed-conference technique was used. Conference leaders were members of the organization best qualified to lead the discussion of the various units. Various training aids were used, such as word charts for each unit, booklets on company rules and regulations, and case-example worksheets on typical situations confronted by an officer. Also, there were exhibits of various types of sanitation equipment, demonstrations of fire-fighting equipment, and sound films were shown.

Shortly after the training sessions, a 43-page plant-protection manual was developed, incorporating all the information reviewed in these sessions. A copy of this manual was given to each officer. It received wholehearted acceptance, particularly because all officers had a hand in developing its contents in the conference program. Today this manual serves to define all duties and responsibilities of an officer, and to guide and instruct him what to do in any situation under his jurisdiction.

Unique emphasis is given to public relations in a 6-page section on rules of conduct for dealing with employees, plant visitors, and business represntatives. Two concluding reminders in that section illustrate the public relations aspect by "You are watching many, but don't forget many are watching you," and "Goodwill, like a good name, is built by many acts but may be destroyed by one."

How well the plant protection officer training program has succeeded is demonstrated by this summary of continuing results, backed by numerous case examples.

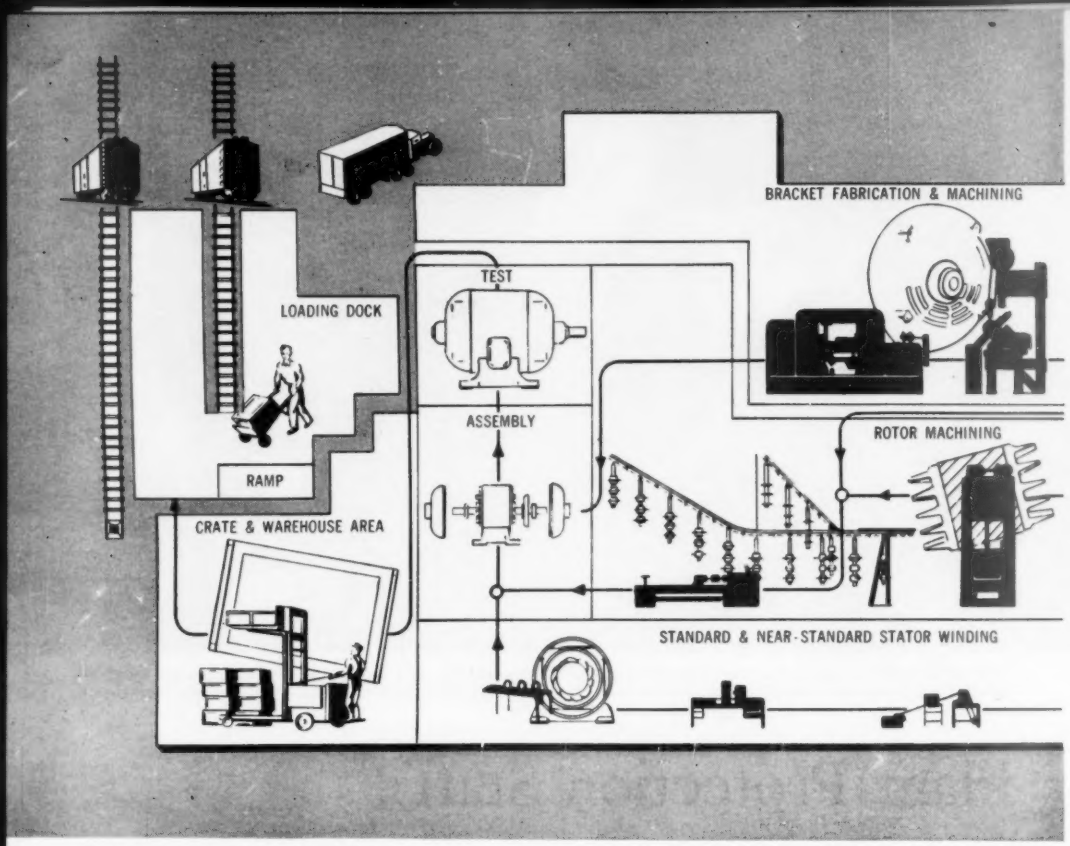
1. Officers give better service to visitors, business representatives, and employees. Besides saving everyone's time, this has improved both public and employee relationships with the company.

2. Morale of the plant protection department is high, largely because of well-defined duties and responsibilities that mean an officer knows exactly what is expected of him.

3. Officers are turning in five times the number of reports as formerly on irregular conditions, because they know more about what to look for. For example, many reports on plant sanitation and fire protection are now flowing in, where formerly there were few.

4. Reports are more complete and factual, because of execution along suggested outlines discussed in conference and briefed in the manual. This saves supervisors many hours a week, because follow-up for more data is no longer needed.

These over-all benefits are bringing about a cleaner plant, and a safer one, and therefore a more efficient one. On that basis alone, the project was worth while.



MATERIALS HANDLING PICTORIALIZED FOR ONE OF THREE SEPARATE PRODUCTION LINES, THIS ONE THE "A" LINE

Handling Costs Cut 50 Per Cent With New Plant Layout

Rather than expand capacity of an existing plant 40 per cent, Westinghouse moved into another plant —and, as a result, made important savings

T. C. FOCKLER • ASSISTANT GENERAL MANAGER, WESTINGHOUSE ELECTRIC CORPORATION, BUFFALO

WHAT KIND OF LAYOUT and handling for a plant to produce a series of new a.c. motors? When management at Westinghouse's East Pittsburgh motor division faced the problem, it came up with this answer:

A new plant, with layout, tooling, and handling equipment specifically engineered for the particular job.

The pay-off is a good one: *The actual cost of materials handling has been reduced by 50 per cent in comparison with the former East Pittsburgh operations.*

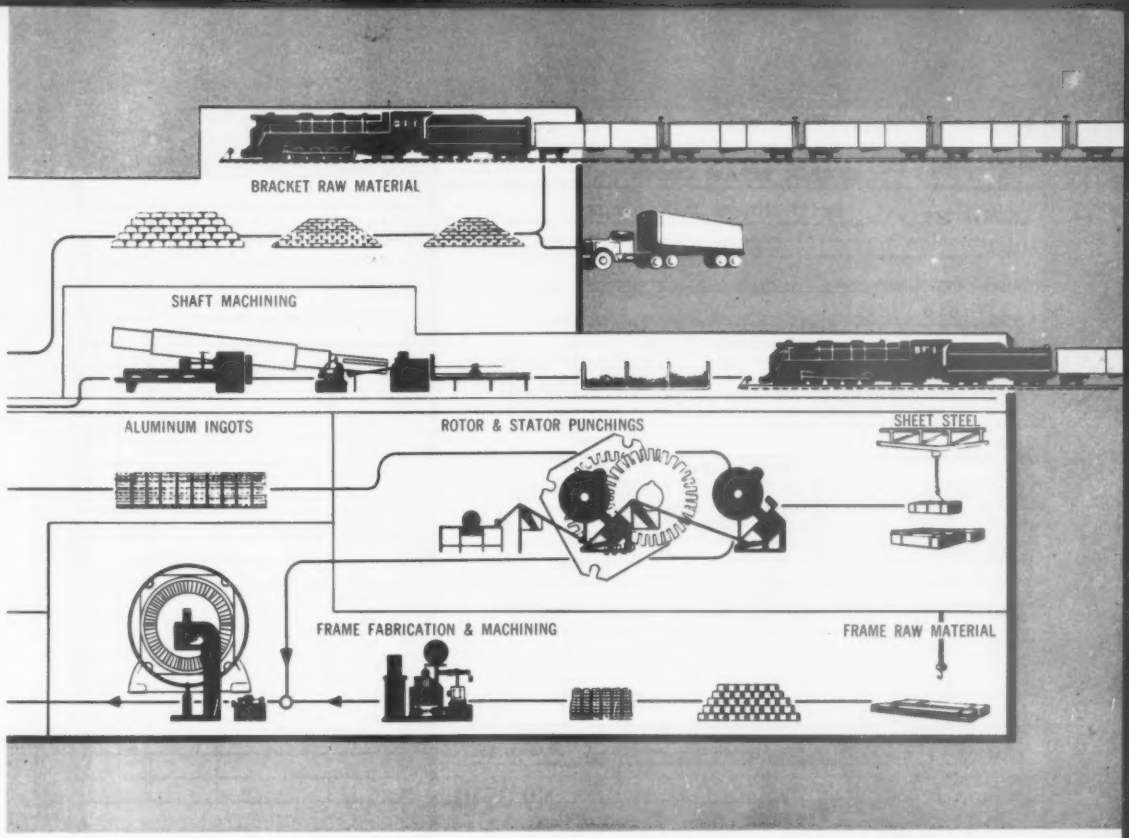
Factors that ranked high on the list of those influencing the decision were these:

1. To meet sales estimates for the new line would have required a 40 per cent expansion in the capacity of the East Pittsburgh plant.

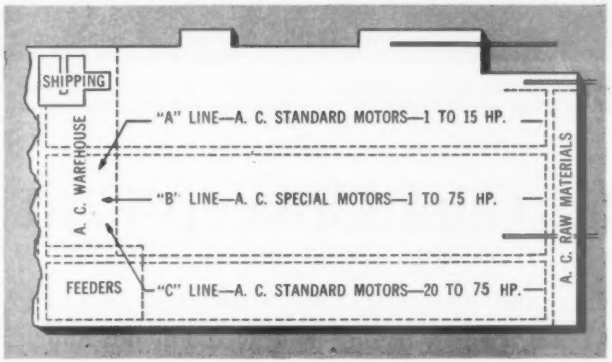
2. Total parts required for the many types of a given horsepower motor had been reduced from 2850 to 126.

3. Much of the production and handling equipment used with the old motors was inapplicable for production of the new.

The layout of the new plant itself was determined by the fact that production requirements for



FOR 1-15 HP. MOTORS, IN THE NEW BUFFALO DIVISION OF WESTINGHOUSE ELECTRIC CORPORATION


SHIPPING
A. C. WAREHOUSE
"A" LINE—A. C. STANDARD MOTORS—1 TO 15 HP.
"B" LINE—A. C. SPECIAL MOTORS—1 TO 75 HP.
FEEDERS
"C" LINE—A. C. STANDARD MOTORS—20 TO 75 HP.
A. C. RAW MATERIALS

PRODUCTION DIAGRAM shows relation of "A" line, as pictured above, to the "B" and "C" lines, which handle different sizes

standard motors of the new type would permit establishment of two separate lines, for 1-15 hp. and and 20-75 hp. motors, respectively. The approximate layout of the 1-15 hp. line is shown in the pictorial sketch. This is known as the "A" line and is designed for production of 20,000 motors per month.

As indicated by the diagram, the "C" line, for production of 2000 motors per month in the 20-75 hp. range, parallels the "A" line on the opposite side of the building. Its physical setup is quite similar to the "A" line, and both of these lines are permanent installations.

Between the "A" and "C" lines is the "B" line, for production of 4500 special motors per month in the entire range from 1 to 150 horsepower. Since many of the parts used in these special motors are standard, it seemed only logical to tie production in with the standard lines. With the "B" area, each type of special motor may be produced quickly on its own special, free-flowing, self-contained line. As each order is completed and the next one made ready for assembly, the old line can be rearranged or torn down quickly and a new one established.

The size of the handling problem adds to the importance of the 50 per cent saving on handling costs. The prime materials required each month just for the motors on these three lines (other motors up to 700 hp. are made elsewhere in the plant) consists of the following: 1000 tons sheet steel; 100 tons foot stock; 200 tons end bells; 375 tons bar stock; 500 tons shaft steel; 90,000 pounds aluminum; 225,000 pounds copper wire; 350,000 feet copper cable.

9-28-48 DATE	8014 ACCOUNT NO.	7671 GROUP CHARGE	E 107 EQUIPMENT NO.

GARAGE REPAIR ORDER

EQUIPMENT DESCRIPTION Smith-Jones lift truck

MILEAGE _____ DATE WANTED 9-30-48 ~~A.M.~~ P.M.

REPAIR INSTRUCTIONS

Repair lift

Charge battery and clean plugs

Adjust and bleed brakes; adjust cables; fill master cylinder

LABOR CHARGE

DATE	MASTER NO.	HOURS	DATE	MASTER NO.	HOURS	TOTAL
9-28	2149	.8	9-30	1813	.9	Hours 2.6
9-28	738	.9				Charge 6.48

PARTS USED

QUANTITY	PART DESCRIPTION	PRICE	TOTAL
1	39Y - 8727		1.08

APPROVED Rut Pierce DATE 9/28/49

WHITE — Accounting
PINK — Garage

Nº 3540

DATE	MILEAGE	ORDER NO.	1	2
8-3-48		976		
11		984		
10		7853		
24		7867		
31		SERVICE		
31		SUPPLIES		✓
AUG. '48 TOTAL				
9-16-48		3045		
18		3540		
30		3677		
30		SERVICE		
30		SUPPLIES		✓
SEPT. '48 TOTAL				

REPAIR ORDER is issued whenever service or repairs on any unit are needed. It serves as a convenient record of labor and material costs

DETAILED RECORD of direct maintenance and operating costs is

Control Plan Cuts Upkeep Cost

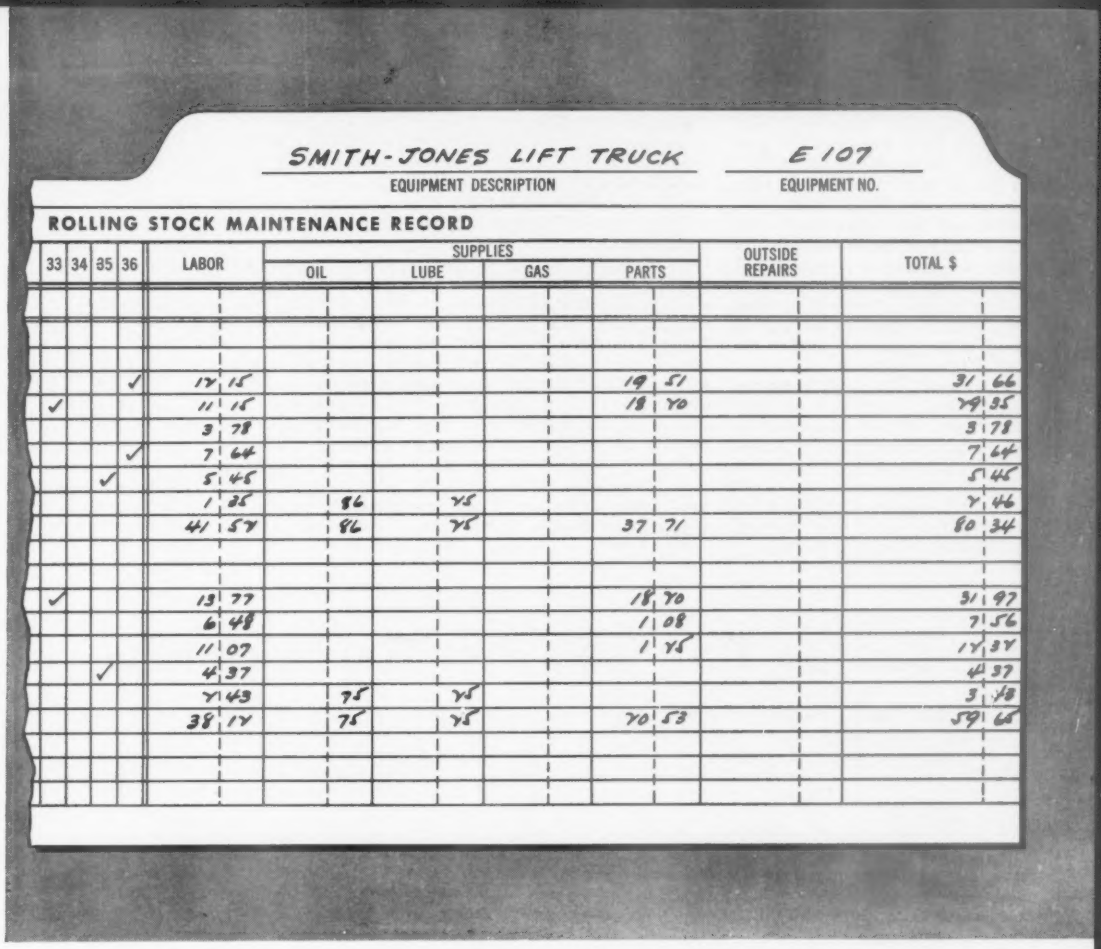
Regular review of maintenance and operating costs of materials handling equipment proves whether or not it is really paying its way, and by how much

NORMAN J. SHIBLEY • SUPERINTENDENT OF SERVICES, TAPCO PLANT
THOMPSON PRODUCTS, INC., CLEVELAND

SIMPLE PAPERWORK CONTROLS over the maintenance of mobile materials handling equipment are saving $1000 per month in the Tapco Plant. This despite the fact that the advancing age of the equipment requires increasingly frequent repairs and service. Although the system was developed primarily for motorized units, it can be applied in principle to all other types of intra-plant or public highway equipment.

During the last few years the plant has acquired some 37 pieces of materials handling equipment, ranging from a small fork lift truck to a 10,000-lb. crane truck. With this equipment, however, came an increase in maintenance costs which tended somewhat to offset the savings that had been anticipated from its operation.

An apparently satisfactory preventive maintenance program for



SMITH-JONES LIFT TRUCK — EQUIPMENT DESCRIPTION

E 107 — EQUIPMENT NO.

ROLLING STOCK MAINTENANCE RECORD

33	34	35	36	LABOR	SUPPLIES OIL	SUPPLIES LUBE	SUPPLIES GAS	SUPPLIES PARTS	OUTSIDE REPAIRS	TOTAL $
			✓	17 15				19 51		31 66
✓				11 15				18 70		29 85
				3 78						3 78
			✓	7 44						7 44
		✓		5 45						5 45
				1 85	86	75				2 46
				41 57	86	75		37 71		80 34
✓				13 77				18 70		32 47
				6 48				1 08		7 56
				11 07				1 75		12 82
		✓		4 37						4 37
				2 43	75	75				3 18
				38 17	75	75		20 53		59 65

kept on the outside of a legal-sized folder for each mobile unit. Completed orders and material tickets are filed inside. Checkmarks in numbered columns show type of repair, so weak spots become conspicuous

# of Mobile Handling Equipment

keeping this equipment in good operating condition was already in use, but there was no way of finding out why it was costing so much to operate and maintain the equipment. A handicap in determining the propriety of these costs was the lack of previous maintenance history. While over-all charges for each unit were known, historical data were lacking as to the type of repair work performed, the frequency of specific types of repairs, the consumption of gas and oil, and the parts replaced. In order to collect this information, the following simple but adequate procedures were evolved.

All materials handling equipment is scheduled and operated from a central materials handling department. In the course of daily work, operators note whatever difficulties occur in the operation of their equipment and report the trouble and its apparent source to the materials handling supervisor. He thereupon initiates a garage repair order in duplicate (Figure 1) and sends the unit with both copies of the order to the garage. Upon completion of the repair, the labor and parts costs and the parts descriptions are entered on the order. The duplicate copy is returned to the materials handling department, which is charged with the work, and the original is filed in the garage in a folder maintained for that particular piece of equipment.

This file folder, called the rolling stock maintenance record (Figure 2), forms a permanent record of all repairs and services performed on any one piece of equipment. On the back of the folder is a repair classification code which breaks down the repair work into 36 pos-

sible categories. These cover (1) complete motor overhaul, (2) general lubrication, (3) to (33) repairs to specific parts of equipment, (34) bump out and paint, (35) wash and polish, and (36) miscellaneous. Before filing each repair order in this folder the clerk enters on the front of the folder the date of the order and its number, checks the proper code column indicating the type of work performed, and enters the cost of labor and parts.

This record also provides for recording of oil, lubrication, and gasoline costs. When equipment is "gassed up" or lubricated, a gas and lubrication record form is made out in duplicate which lists the amount and cost of gas or oil used and the equipment to which it is charged. Distribution of copies is identical to the repair order. The cost of gas or oil consumed is posted to the cover once a month from the slips accumulated in the maintenance folder. Dollar value only is recorded, as "amount used" can readily be calculated, if the need arises, from the filed gas and lubrication orders.

The value of this permanent record is manifold. It tells at a glance which types of repairs occur most frequently. After the record had been in use for about 90 days it was found relatively simple to diagnose which parts or components of equipment wore out most frequently or required an excessive amount of repairs. Such knowledge provided an opportunity to include breakdown prevention in the preventive maintenance program.

In addition, a practice is now made of informing the equipment manufacturer where frequently recurring repairs to a part have indicated that the fault may lie in a basic design or material error. Information on frequently repaired parts is also used when reordering similar types of mobile equipment. Reorders usually specify that the unit be furnished with improved parts that will minimize the repairs previously experienced.

Another result of detailed cost-consciousness has been the training of equipment operators in good maintenance habits. Operators are now required to check the following at the beginning of each shift: crankcase oil, coolant, battery, air cleaner, gas and oil. These simple checks have averted many serious breakdowns.

On-the-Job Test Spots Precision Machinists

SCHWIEN ENGINEERING COMPANY, Los Angeles, has developed a simple and practical shop test that takes much of the guesswork out of hiring precision machinists. This is a real achievement because the company holds to extremely close tolerances.

The test is not an elaborate psychological measuring device, but it has accomplished its purpose.

Applicants first fill out an abbreviated application form. This is followed by a short interview, the purpose of which is to weed out those candidates who are clearly not qualified. All this takes no more than an hour—usually less.

The test is conducted right out in the shop, using production equipment. Test parts are a pair of brass candlestick holders, for which a supply of rough-turned blanks is kept on hand. The applicant is given a finish-dimension blueprint of the candlestick holders and a pair of the rough-turned parts. He is instructed to machine the blanks to the dimensions and tolerances shown on the print. He is also told that he will have just four hours to work, and will be stopped at the end of the period.

The tolerances to which the parts must be finished are close. For example, some dimensions are held to plus or minus .0003 inches, and others to minus zero and plus .0005. The applicant's ability to meet these specifications is critically evaluated. This evaluation reveals not only manual skill, but also ability to read the type of blueprint which the shop uses. Grading also takes into account the finish and appearance of the test parts, and the time required.

To provide some incentive to the applicants for the time they devote to taking the test, the two candlestick holders are completed by the shop, if necessary, and chrome plated. This is done regardless of the outcome of the test, and the finished holders are then delivered to the applicant free of charge.

The use of a practical shop test of this type was a novel idea for the company and therefore needed selling to supervisory personnel. The initial reaction was negative, largely because everyone thought that the good machinists would refuse to take the test, either as a matter of personal pride or on the grounds that a short tryout would not be fair to them. In actual practice, these worries turned out to be unimportant. Out of the first 48 applicants who were told about the purpose of the test and who were then invited to take it, only one refused. Further, not one of the 47 who took it complained that the conditions were unfair, even though not all passed or were hired. These experiences quickly convinced all concerned that the only candidates scared away would be the poor ones who weren't wanted anyway.

The company's experience has been that the use of on-the-job tests is a definite aid to the intelligent hiring of precision machinists. While the technique does not remove all of the gamble from hiring, it does substantially reduce the margin of error. To the extent that the test is incomplete because it covers only the engine lathe, it can be argued that it is likely to give deceptive results. Practically speaking, this is not a serious problem. Every test is at best a sample of the job applicant's performance and cannot be expected to accomplish the same function as weeks of actual observation of the worker on the job.

To get as much information about a candidate as possible in as short a time as possible is the basic purpose of job tests. The information gained is only as good as the tests that are used. And the tests improve in value as they get closer and closer to the actual duties that have to be performed.

The test is a true sample of the type of work that the applicant will later be required to perform. Furthermore, such a test is conducted right in the shop under regular working conditions. For this reason, the practical job test goes a long way toward giving management a significant preview of a machinist's energy, aptitude, skill, and speed.

DISPATCHER in yard office uses hand-type telephone set to transmit messages to locomotive cabs. Log of calls is kept, making a check-back possible

TRANSMITTER, heart of control system, is conveniently near the office

Radio Control of Rail Traffic

RADIO CONTROL of rail traffic in the Butler, Pa., plant of Armco Steel Corporation saves hours of transportation time.

The Federal Communications Commission recently granted a radio license for the Butler plant's station. A fixed transmitter in the yard office is the heart of the system. Through this control station, on a two-way system, engineers and crewmen of the five locomotives and two yard-cranes can discuss their movements with the central office dispatcher. With 18½ miles of railroad track over which raw materials, fuel supplies, and finshed products must move, radio control provides the medium through which quicker service is obtained at lower cost.

RECEIVER in the locomotive cab is fixed behind the engineer's head. He holds in his hand the transmitter for replying to a call from the office

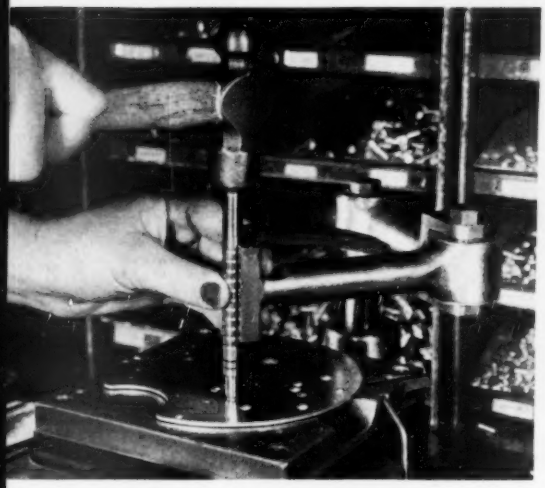
Cases in Methods Improvement

IDEAS AND SUGGESTIONS for methods improvements are screened, developed, and discussed at management meetings at Sangamo Electric, Springfield, Ill.

Employee cooperation in methods improvements is practically automatic as a result of having all production workers on incentive, with a guarantee of as much or more when improvements are made.

Ten methods improvements principles are applied to all operations: No operation is perfect. Improvements don't just happen; someone must suggest them. No idea is too small to be considered. Employee and management suggestions receive equal consideration. Determine utility value of all movements and motions. Eliminate ineffective and fatiguing motions. Utilize present methods fully before advocating change. Use simple gadgets and devices rather than complicated mechanisms. Evaluate the cost of making change and potential savings. Sell employees and supervisors on improvements before installation.

Here are seven recent improvements that have brought substantial savings to Sangamo.

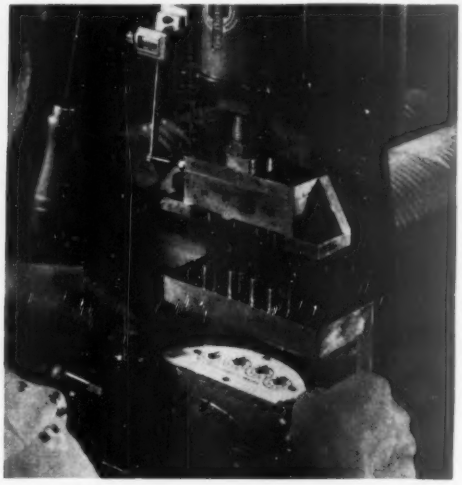


STAKING FIXTURE

Old method: Position staking tool approximately upright with aid of free hand-staking block. Strike with hammer.

New method: Position staking tool absolutely upright with aid of freely moving, two-jointed fixture. Strike with hammer.

Results: Productivity up 10 per cent. Quality rejections due to nonvertical positioning of staking tool eliminated.



DIAL-HAND STAKING

Old method: Assemble recording hands to pinions on meter one at a time, by hand. Position recording hands, one at a time, to zero setting.

New method: Swing locating fixture into position over assembled register. Place dial hands in prepositioned slots through fixture. Actuate pneumatic staking tool to stake dial hands in position. Swing locating fixture out of the way, remove register. Repeat. All four hands are staked in one stroke.

Results: Accuracy of zero-setting improved. Production increased 300 per cent. One-half less floor and bench space required. Maintenance and tools reduced by 75 per cent.

HEAT TREATING

Old method: Four operators each perform complete cycle: Prepare rotor cups, heat treat in common gas furnace.

New method: One operator places rotor cups in high frequency induction heat-treating machine. The output is automatically controlled because the timing cycle of the machine is fixed.

Results: Productivity up 300 per cent. Rejections cut 50 per cent. Bench and floor space required reduced by 25 per cent.

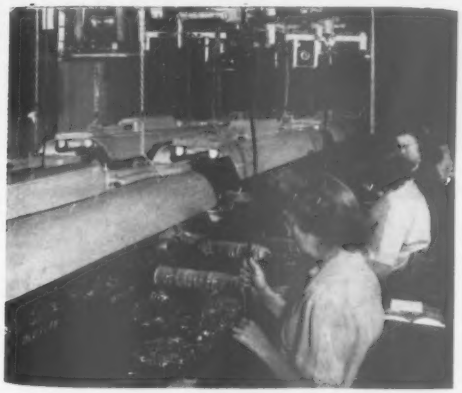
2·Sangamo Electric Company

RIVETING FIXTURE

Old method: Two operators each performed complete cycle: Load front plate and pillars of dial plate assembly on riveting machine. Actuate machine. Remove assembly from fixture on machine.

New method: Two operators with one machine work as a team. First operator (not in photograph) assembles front plate and pillars on removable fixture. Second operator inserts loaded fixture in machine. Actuates machine. Removes assembly and fixture as a unit from machine. First operator removes assembly from fixture and reloads it.

Results: One machine released for other work. Production capacity of remaining machine increased 30 per cent above combined capacity of two machines. Required bench and floor space cut 50 per cent.



CABLE-POWERED SCREWDRIVERS

Old method: Operators used hand screwdrivers for assembly of "J" meter register.

New method: Operators use individually power-driven screw drivers activated by flexible dental cable through a mechanical clutch that assures maintenance of a pre-set torque. Relatively small size and light weight of cable-driven screwdrivers makes for accuracy and ease of handling in delicate assembly work.

Results: Quality improved. Productivity up 25 per cent. Bench and floor space cut by 25 per cent.

LAMINATION COUNTING AND LACING

Old method: Count, by hand, required number of laminations for potential element of "J" assembly. Stack laminations by hand. Insert laminations in iron core. Lace laminations in core by hand.

New method: Place lamination from stack on table in automatic counter. Place iron core from tote pan in fixture. Press foot pedal, which activates mechanism to count laminations, move them into core, and, by hydraulic pressure, lace them in core.

Results: Productivity up 1100 per cent. Bench and floor space required cut by 90 per cent. Great uniformity of product due to mechanical gaging.

BEFORE **All handling in shipping room was in castered, wooden containers. Maintenance costs were high, housekeeping was poor, and many individual jobs were handled inefficiently as a result**

Out-of-Date Shipping Room Put

As part of a company-wide cost-reduction program, the axe fell on the shipping room. Result: Better housekeeping, less confusion, easier work, lower cost

D. C. RHODES • INDUSTRIAL ENGINEER, PITMAN-MOORE COMPANY, INDIANAPOLIS

MODERNIZATION of the shipping room was a key project in Pitman-Moore's cost reduction program. More efficient individual workspace layouts and conveyorization of unpacked and packed orders in the shipping room were the cornerstones of the improvement.

Restyling of toteboxes permits all goods to be moved to and through the shipping room by roller conveyor. And the maintenance cost of the new toteboxes is low compared to the old-style castered wooden toteboxes.

Application of the division-of-labor principle has resulted in making truly efficient workers of men who were formerly jacks-of-all-trades. Each man used to make his own boxes in addition to packing orders. Now a simplified line of boxes is made up at a central location ("10" on the diagram) and is delivered to the packing stations by special hangers on an overhead conveyor. As an additional advantage of this move, it became practical to make the boxes by stapling rather than by gummed tape. The delivery conveyor acts as a storage rack as well as a carrier.

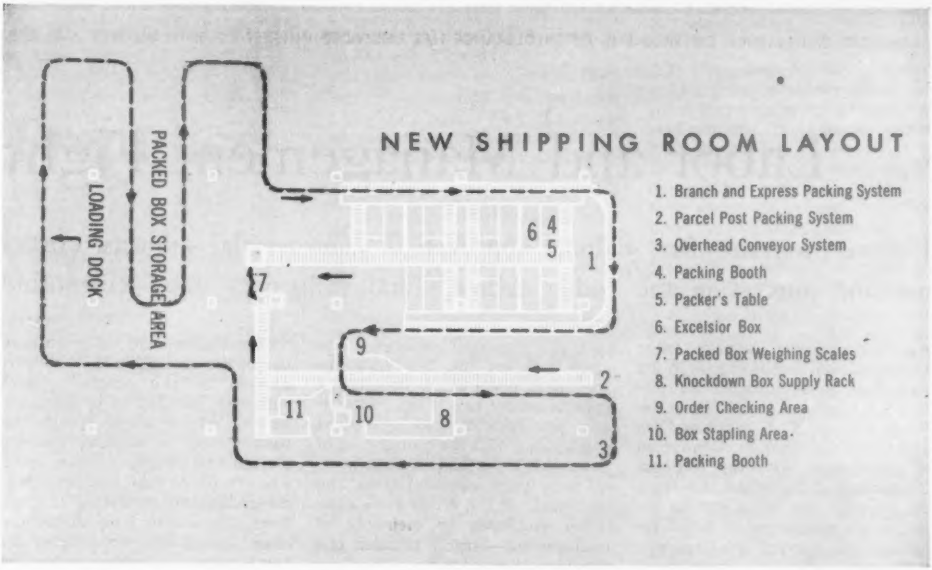
Separate lines have been established for parcel post and branch and express packing. The parcel post line is a single, straight conveyor (2). The seven individual stations for branch and express packing are located within a U-shaped delivery conveyor (1).

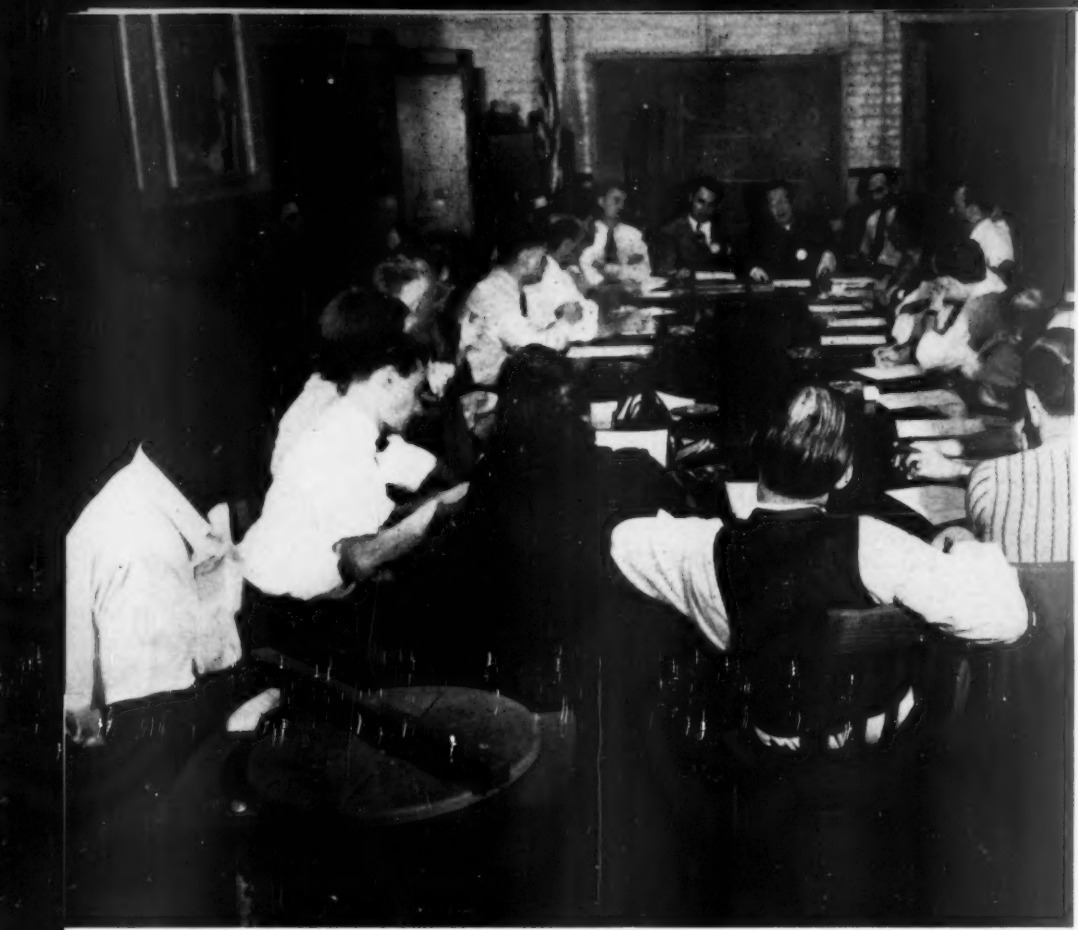
At each station, the packing booth (4) is centrally located to provide the packer with easy access to the delivery conveyor, his packing table (5), and the excelsior box. On the fourth side of the packing booth is a short, transverse conveyor which carries completed packages to the main return conveyor for the trip to weighing (7).

The modernization program has not only improved individual jobs in the shipping room. Use of conveyors for virtually all transportation keeps orders moving, elimintes confusion, and prevents temporarily "lost" orders. Our housekeeping has been improved, too; and we enjoy a considerably lower operative cost than under the old arrangement.

AFTER New toteboxes bring goods to packers on roller conveyors. Special hangers on overhead conveyor deliver preformed cartons. New workspace layout cuts cost, makes jobs easier

on a Production-Line Basis





ORGANIZED CONFERENCE ON PROBLEMS OF INTOLERANCE HAS UNDIVIDED INTEREST OF BOTH WORKER AND BOSS

Labor and Management Fight

Unique program offers rational approach to controversial subjects, creates genuine interest in the "other fellow," and influences good citizenship

AN EXPERIMENTAL HUMAN RELATIONS program that is unique in the American labor-management picture has just been completed at the Perth Amboy, N. J., plant of General Cable Corporation. Conducted in cooperation with the National Conference of Christians and Jews, the program has as its specific objective the combating of racial, religious, and cultural intolerance.

To accomplish this objective, a carefully organized conference program was set up. Ten meetings were held, one a week. Each lasted approximately two hours. Attendance was limited to 25 local plant employees. With the cooperation of the union, about half of those present were union representatives. The remainder of the group were non-union employes or members of management—largely foremen and department managers.

Conferences were led by authorities in the various fields that were covered in the program. Each authority, assisted by a discussion leader, talked about specific religious, racial, or cultural problems for the first twenty minutes or so. The rest of the time was devoted to discussion and answering of questions. Discussions were animated—often heated—and constituted the key portion of the program because

ALL GROUP MEMBERS PARTICIPATE

Prejudice

they brought every member of the group into active participation.

The topics for the ten conference sessions were:

1. The over-all picture of the fight against prejudice
2. The Catholic religion
3. The Jewish religion
4. The Protestant religion
5. The human race—differences in physical characteristics
6. Cultural differences
7. Community inter-group relations and the plant
8. How to handle prejudice and prejudiced people
9. Major inter-group problems and learning techniques
10. General summing up and planning for future meetings

Attendance at all conference meetings was on an entirely voluntary basis. The only requirement for continued attendance was the personal interest of the participants. An evidence of this interest was the fact that attendance was 100 per cent throughout.

When the idea for such a series of conferences was first up for consideration, management was frank in admitting that it had no preconceived notion of what the outcome might be. Aside from the solid conviction that improved inter-group cooperation and understanding was a worth-while goal, the company looked on its program as an experiment in an area of human relations that had not previously been explored in this way by an industrial organization.

It was recognized, of course, that venturing into an unknown field had its dangers. There was, for example, the hazard that the harmonious relations in the Perth Amboy plant might actually be disrupted if the idea backfired and stirred up suspicion and distrust instead of accomplishing the purpose for which it was intended.

In spite of the possibility of trouble if the plan failed to work out as hoped, the company went ahead with its arrangements, feeling secure in the potentialities of the program and with confidence in the ability of its plant management to handle any incident.

It soon became evident that there was no reason to be concerned over a possible backfire. The idea caught on, and at the conclusion of the program both labor and management were sold on the benefits of this pioneering effort.

Although no effort has been made to weigh the results in dollars and cents, there is evidence that they are substantial.

"The results to date," according to General Cable's president, D. R. G. Palmer, "indicate that all segments of our plant personnel are convinced of the desirability of carrying forward the broadening influence of this program . . . To those who read or hear of our experiment at Perth Amboy, we cannot overemphasize our belief in the values to be obtained from such a program, of its influence upon good citizenship, and the improvement in the spirit of teamwork brought about in large part by our willingness to have a free and open discussion rather than a submerged fermentation of issues."

Further evidence of the type of result to be expected from inter-group relations activities comes from the Bureau of Applied Social Research of Columbia University, which was brought in to make independent evaluation of results. A representative of the bureau attended all meetings, listened to comments, and followed up changes in ideas and viewpoints expressed during the meetings.

The analysis of the conference revealed, according to the bureau, four positive results:

1. The rational approach to controversial subjects is a valuable tool. The meetings really were "lessons in communication" to some of those who attended. New ideas and concepts were opened up for the conferees. One person commented, for example, "I never thought I'd have a chance to talk to a rabbi." And another stated, after one of the meetings on religion, "It is a real lesson to hear everybody talk about these personal things."

2. A genuine interest in the "other fellow" was created. One outcome was the development of self-confidence in bringing discussions of racial and religious problems out in the open, instead of keeping them on a surreptitious level. Coupled with the factual information gained at the meetings, this had a wholesome effect.

3. There were feelings of tension among group members which indicated that their group participation was genuine. The tension, particularly during the discussions of religion, was not due to anti-religious feelings but rather to surprise at facts about the religion for which they had not been prepared. This led to more careful thought and is the path to changed opinions and greater tolerance.

4. A much wider audience than just those in attendance was reached. There was considerable discussion of the meetings throughout the plant and in the community. The same type of discussion was thereby encouraged elsewhere.

In view of the favorable results, all have agreed to continue the work started, and the company plans to organize similar conferences at its other plants.

GOOD PLANT HOUSEKEEPING always reflects the operating principles of top management, but it takes persevering work down the line to keep a plant clean. In this plant each production worker cleans his machine at the close of his shift, and at night ten cleaners spruce up all machines and equipment during nonoperation

You Can Have a Clean Plant

HENRY J. KREUTZINGER • SUPERINTENDENT OF MAINTENANCE, PLANTS 1, 2, AND 3 ALLISON DIV., GENERAL MOTORS CORP., INDIANAPOLIS

GOOD HOUSEKEEPING AT Allison is not the result of wishful thinking. It's hard work. It takes lots of time and effort to keep this group of plants, with over one and one-third million square feet of floor space, tidy and clean.

Management at Allison fully realizes this fact and calls good housekeeping a necessary expense. But it's considered a worth-while expense, because management has proved it so by these results:

1. A clean work area raises employee morale and cooperation in housekeeping objectives.

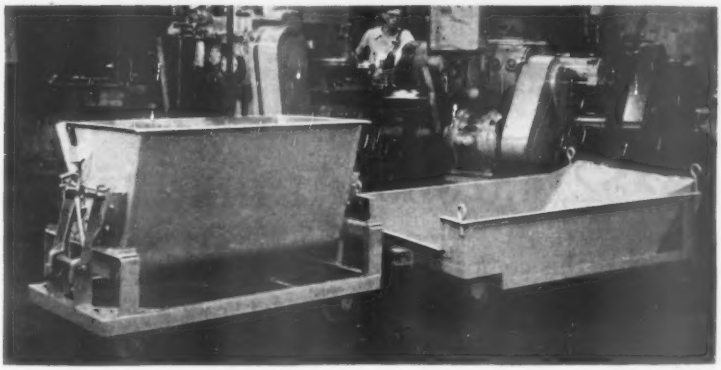
2. Cleanliness and orderliness aid high quality production.

3. Good housekeeping lowers plant upkeep costs, reduces employee fatigue, and reduces accident and fire hazards.

4. A clean plant, inside and out, improves public relations.

Second only to management's insistence on a program of good housekeeping, to assure its success, is the provision of good supervision over an adequate staff. As a direct function of the maintenance department in plants 1, 2, and 3, Allison employs 107 men and 50 women in its plant housekeeping department. This is exclusive of other housekeeping personnel for (1) yard maintenance and care of grounds and greens; (2) building

PLANNED SCHEDULES call for machine-scrubbing of every square foot of the plant four times a year. Aisleway vacuum sweepers pass every point in the plant at least twice a day, and some points four times daily



PROPER EQUIPMENT facilitates waste collection. For example, two basic types of containers used are the open-top dump (right), for chip collection, and the side-dump (left), chiefly for cast-iron dust

. . . If You Want to

maintenance, which includes care of interior walls and painting; and (3) cleaning of office areas, which is done at night by a separate crew.

Housekeeping Organization

Five daytime foremen, reporting directly to the superintendent of maintenance, head up the housekeeping organization. Two more foremen work nights in plant 3, which because of its size is divided into three zones. There is one supervisor for about every 20 people doing housekeeping work.

Each foreman is responsible for all housekeeping in a definite zone. His duties cover four main cleaning functions in his area: (1) floors and windows; (2) all plant equipment, conveyors, machines, etc.; (3) chips and trash; and (4) employee facilities, such as toilet areas, rest rooms, and restaurants. The zone arrangement leads to a competitive spirit, which is enhanced very greatly by periodic inspections throughout the plant by top management.

Cost of housekeeping supplies has been noticeably reduced since the introduction of a central supply crib in one zone and a branch crib in each of the other zones. Consumable supplies are issued on material expense requisitions. Tools and equipment, such as brooms, gloves, and rags, are charged to the worker. Before this system was installed there was an abnormal loss of cleaning supplies and equipment, particularly gloves and rags. Workers used to build up a bank of supplies at their work stations or lockers. But now they must check out and check in all items at the supply crib.

Another economy was achieved by provision of a general-purpose cleaning solution. Large tanks for mixing and storing this solution are centrally located in each zone. By maintenance of a standard premixture in these tanks, individual mixing in varying and inefficient proportions has been eliminated.

Third in importance for success of a plant housekeeping program is the use of efficient equipment with proper methods. In the accompanying illustrations are featured some of the never-ending, persistent routines that keep the floors and machines clean and the employee facilities attractive.

Power Sweepers

Sweepers are assigned to each department for continuous cleaning of floors. Eight power-driven machines—four floor washers and four aisleway vacuum sweepers—operate over the entire area continuously. All windows are cleaned inside and out every month, and more often in areas where sludge or film occur.

In addition to scheduled cleaning, machines, and also every wall area, are painted regularly. The walls are painted at least once every two years, and in some areas more frequently. Typical of the thorough demands of the program is the prohibition against counter deodorants in toilet areas, in the belief that odors from uncleanliness should be removed rather than covered up.

But there's another factor not to be overlooked in service work of this kind. It's the human element. At Allison thoroughness in performing housekeeping chores is emphasized, and all workers are constantly aware of the department's slogan—"A job once done right, is done twice."

CONTENTS of all scrap containers are tagged by foremen rather than rely on container markings

BRASS SHAVINGS are quickly processed through a magnetic separator to eliminate steel chips

Getting $2,000,000 Annually

Refusing to consider scrap as junk, this company can show worth-while and continuing investment returns on efficient salvage and reclamation equipment

WILLIAM H. HAESE • SUPERVISOR, SALVAGE DEPARTMENT, ALLIS-CHALMERS MANUFACTURING COMPANY, MILWAUKEE

ALLIS-CHALMERS SELLS NO "WASTE" materials that it can reuse economically. This thrifty consideration of "manufacturing byproducts" has raised its scrap salvage and reclamation program to a current big-business stature of $2,000,000 annually in reclaimed material values.

The big-business label does not mean the program is a complex or expensive one. On the whole, it's a simple matter of coordinated collection, pickup, segregation, and processing of salvagable materials, and distribution of reclaimed items for further use, with minimum delay, effort, and expense. Materials include metals of all kinds, oils, paper, rags, lumber, and discarded tools and equipment garnered from shops and offices.

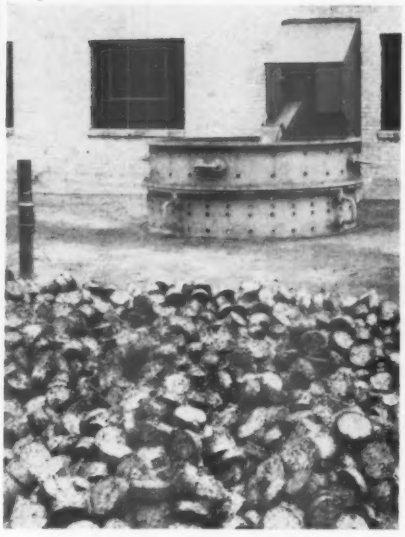
Flow of materials was an important factor in setting up efficient salvage operations. The salvage department's collecting station is centrally located, to minimize transport costs. Accessibility by rail, trucks, and cranes for moving material to or from the station, and a down-the-line movement of scrap from breaker yard to breakers, presses, and the foundry were all planned to effect the greatest possible economy in handling.

Collection of Scrap

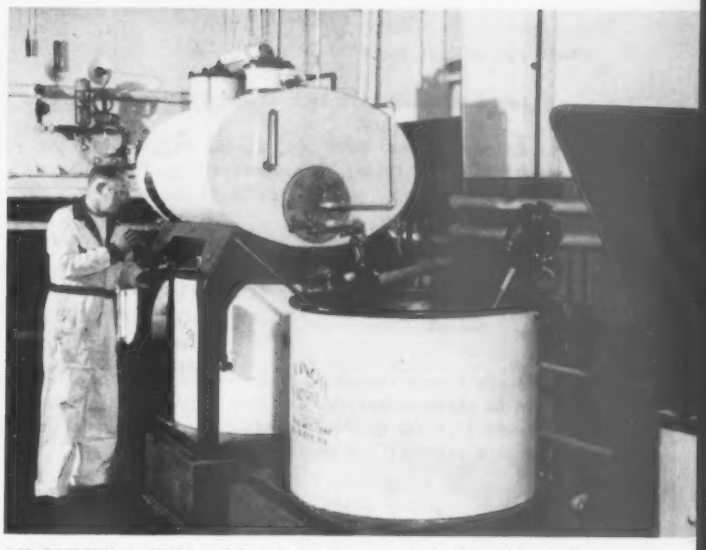
Scrap collection follows a definite pattern that requires the cooperation of production and salvage personnel. Production workers, for example, must segregate the various scrap metals at their source, to avoid unnecessary handling time and expense and to obtain a higher unit price. Salvage crews see that this policy is carried out. Drums, bins, or platforms are placed at machines whenever the type of metal being worked is changed, or when a filled container is ready to be picked up.

Containers generally are unmarked, to avoid an unbalanced inventory and to minimize mistakes in contents. Salvagable metals are identified by tags bearing the section foreman's signature, to verify contents. Color codes are not used. Any discrepancy is charged to the foreman. This system eliminates repetitive carelessness or indiscriminate mixing of metals.

After all nonferrous metals are brought to the scrap collection yard they are further segregated by hand or machine, preparatory to disposition either to the foundry or by sale. Brass is run through a magnetic separator to eliminate



CAST - IRON BORINGS or steel turnings are pressed into briquettes



OIL REFINING UNIT reclaims 30 to 40 per cent of all purchased oils, at a cost of only 8 to 14 cents per gallon, for reuse in various operations

From Scrap Reclamation

any steel chips unavoidably mixed with it during machining. Dry brass is run through once, wet brass, twice. Identified metals are then tested by metallurgists as to suitability for remelting in the company foundry. Those unsuitable are sold on a contract basis to the highest bidder. Enough metal scrap is now being reclaimed for the foundry to be able to meet all its scrap needs, except that for secondary tins.

Everything Has Value

Nothing at A-C is considered as waste, in the sense of being of no value. Lumber is reclaimed for maintenance construction and crating. Paper is baled and sold. Here again, separation brings added values. Large, usable pieces of steel and iron, if not returned to the shops or foundry, are used in structural maintenance. Rags and burlap that cannot be used in maintenance work or other ways are sold. Tools and appliances that have outlived their usefulness are collected, segregated, and sold.

One example of the thrifty regard the company has for scrap is the handling of scrapped files. Files ten inches and longer are recut for further use; smaller ones are saved for the foundry or made into scrapers.

Oil Salvage Methods

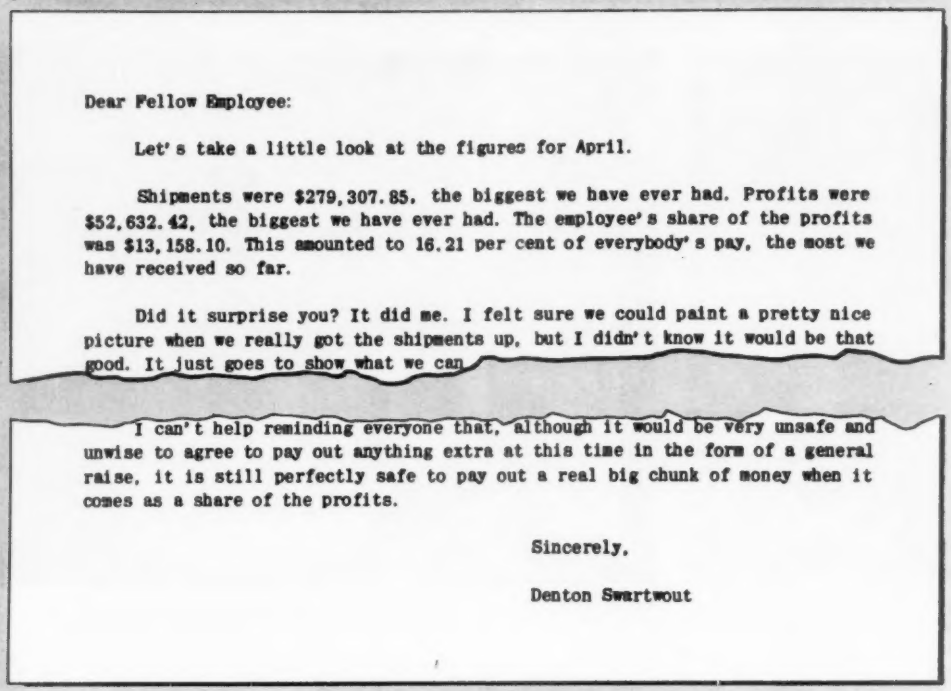
Reclamation of industrial oils is the most recent addition to the salvage program. A complete refining unit reclaims machine oils, hydraulic oils, cutting oil, and diamond-cutting and mineral lard oils, at a cost ranging from eight to fourteen cents per gallon, for reuse in the various machining and lubricating operations.

As in the case of metal scrap, a strict waste-oil collection policy applies. Lubrication personnel must keep the various oils separated, and must exclude all naphtha, grease, cleaning fluid, and other liquids from oils to be refined. Each container is tagged with the type of oil it contains, both before and after processing. Tags also bear departmental symbol and foreman's signature.

Waste oil is delivered by truckers to the oil house, where it is stored, according to classification, for analysis to determine whether or not it is reclaimable. Oil too contaminated to warrant analysis or refining is dumped into sump tanks, screened, heated to 180 degrees F. to remove water and sludge, and then pumped into settling tanks for use as fuel or road oil. Reclaimable oil is processed in the refinery and stored in drums in an adjoining room for future use. At present the company is reclaiming 30 to 40 per cent of its purchased oils.

Other Byproducts

A salvage program of this breadth has its own byproducts, two of the best being the education of all personnel in the value of all kinds of materials, and its equally valuable sequel, war on waste. Excessive scrap is usually a clue to inefficient operation. Correction of causes not only conserves material and equipment but also reduces the cost of the product. That's an extra dividend not to be ignored by any company.



Dear Fellow Employee:

Let's take a little look at the figures for April.

Shipments were $279,307.85, the biggest we have ever had. Profits were $52,632.42, the biggest we have ever had. The employee's share of the profits was $13,158.10. This amounted to 16.21 per cent of everybody's pay, the most we have received so far.

Did it surprise you? It did me. I felt sure we could paint a pretty nice picture when we really got the shipments up, but I didn't know it would be that good. It just goes to show what we can

I can't help reminding everyone that, although it would be very unsafe and unwise to agree to pay out anything extra at this time in the form of a general raise, it is still perfectly safe to pay out a real big chunk of money when it comes as a share of the profits.

Sincerely,

Denton Swartwout

LETTERS FROM THE PRESIDENT TO EMPLOYEES PERIODICALLY GIVE THEM THE FACTS ON PROFIT ACCOMPLISHMENTS

Everybody Benefits in This

Successful application of this simple, plant-wide profit sharing plan began by showing employees how profits are made. Further steps scorned inner-office mystery in favor of intimate financial reports to the union and all workers

DENTON SWARTWOUT · PRESIDENT, THE SWARTWOUT COMPANY
CLEVELAND, OHIO

WE ASKED OUR EMPLOYEES to formulate our profit sharing plan. They were freely told the elements of our financial structure and economy. Under management guidance they came up with a plan that has proved successful. Measured by the yardstick of dollar results, the proofs over the past two years have been:

1. Increases up to 12 per cent in worker take-home pay

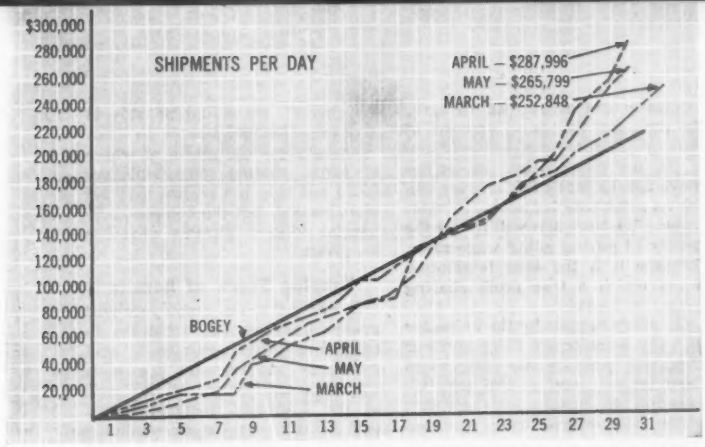
2. Increase of 2.5 per cent in net operating profit, after taxes and profit sharing

3. Decrease from $0.146 to $0.124, or 15 per cent, in direct labor cost per dollar of sales.

There are other intangible but significant benefits in improved employee relationships, because employees have come to realize continuing profits are the result of sound administration of company finances. They recognize the validity of fixed expenses and the rights of stockholders. They know that less waste and more efficiency keep down operating expenses, and mean more profit to be shared. All of which has brought about the tangible results already stated.

Selling the Idea

Three years ago we began talking about profit sharing as a realistic means of expressing our belief that all people in a business enterprise should have a part in the fruits of their labor. We began



GRAPH COMPARES ACTUAL SHIPMENTS WITH MINIMUM LEVEL FOR A PROFIT

MONTH	SHIPMENTS	PROFITS	EMPLOYEES' SHARE	APPROXIMATE PERCENTAGE OF YOUR PAY
MARCH	$ 244,405	$ 36,471	$ 9,117	10.97%
APRIL	279,308	52,632	13,158	16.21%
MAY	254,246	31,030	7,758	9.58%
TOTALS	$ 777,959	$ 120,133	$ 30,033	12.26%

CHART SHOWS EMPLOYEES' SHARE OF PROFITS AND DATE OF PAYMENT

Profit Sharing Plan

by taking the matter directly to our employees. I told them all the details of our present capital setup and the relationship of that capital to their wages, our profits, the machinery we required, and all of the various phases of our business. They were told the company believed in high wages—that we sincerely felt it would be a wonderful thing for the individual, the company, and the community if wages as high as $3.00 an hour could be paid. Explanation was then given as to why this high wage was not possible.

Employees were told the company wanted its employees to consider the company's future as their own, and that its stability, and therefore theirs, depended upon how progressive its operations were and how strong it was financially. We explained it would be simple to give entire profits to them, or the stockholders, or to buy fancy equipment with it, but such unwise distribution would interfere with long-range stability. The prime job of management was pointed out to be the charting of a course that would make the company's position financially stable, its products for its customers the best, and my job and theirs the most secure possible.

Naturally, employees raised questions as to when there would be profits and what they would amount to. These questions were impossible to answer at the time. We stated, however, that we intended to leave nothing to their imagination and that when the profits did come, *they would know exactly what they were and how they were to share in them.*

First problem, then, was to improve the company's profits position. Unless there were profits to share, the best of plans for their distribution might boomerang. Why not give employees a chance to suggest how this might be done?

The Heart of the Plan

And so the very foundation of the plan began with the creation of a "junior board of directors." It was recognized at the outset that profits would only be forthcoming if more efficient production and paperwork methods were developed. The purpose of the junior board was to devise ways and means to improve efficiency and increase production, to eliminate waste of material and labor, and to improve our products so that our customers would be better pleased. This was to be accomplished by constant watchfulness over all operations of the business.

The junior board of directors consists of six members, drawn from nonsupervisory personnel. Each member serves for six months. On the first of each month, the term of one member expires and a new member takes his place. Thus, there are at all times five old members and one new member on the board. The senior member of the board—that is, the member serving his last month on the board—is the chairman for that month.

Each month the junior board recommends to management one or more candidates, from which list the management selects the member to take office at the beginning of the following month. His selection is based on his potential ability for accomplishing the objectives of the board. The junior board, in making its recommendations, always keeps in mind the advisability of having all parts of the factory and office, as well as both divisions of the company, represented at all times. The object is to get the broadest viewpoint on helpful ideas from all 250 employees.

No member of the junior board can succeed himself for a second term. However, after a lapse of at least one month he may again be recommended for appointment.

Accurate and complete records are kept of everything accomplished by the junior board. These include disposition of suggestions which have been received, and reports to the management of any actions it recommends be taken.

The first job undertaken by the board was devising a fair and equitable profit sharing plan. The possibility of serious repercussions

developing from nonfeasible plans was realized by management, but it was felt there were certain educational advantages involved. Also, a plan so devised would have greater employee acceptability.

Some unsound proposals actually were made. Among these were that the company should distribute 50 per cent of its profits to employees, and that profits should be distributed in equal amounts, man for man. The first proposal was reduced to 25 per cent, with the board's consent, after it was explained that profits were also required to satisfy stockholders, company indebtedness, taxes, and needs for new equipment and working capital.

On the second proposal, it was suggested that profits be divided in proportion to the total earnings of each employee, because the higher paid (and hence higher skilled) employees, and those who spent more time on the job, were in a position to make a greater contribution to the profits. After seeing the logic of this reasoning, the board readily assented.

Installing the Plan

The profit sharing plan was set up to start as of January 1, 1947. We agreed to set aside 25 per cent from all net profits, before federal taxes were deducted, for distribution among all regular employees, including the office and supervisory force, in proportion to earnings.

Profits are divided every three months. For example, profits earned during the months of January, February, and March are paid as soon as they have been determined, usually late in April. These payments are made as a separate item in the paycheck immediately following the profit determination.

Any adjustment in profits for the preceding year, after annual audit of the books, is carried into the current period at the time the adjustment is determined. Each year stands separately, insofar as profits go. That is to say, losses incurred during any month of the year must be made up by profits in succeeding months before there is any net profit to be divided, but losses are not carried forward from one year to the next.

Invariably the introduction of a profit sharing plan leads employees to question: "Why not give a general wage increase instead?" We have answered that while it is perfectly safe to take a share out of profits, it is very unsafe, both for company and employees, to agree to pay out the same amount of money whether or not it is there.

On the other hand, all parties have agreed that profit sharing can be no substitute for adequate wage rates. We have and will follow the policy of paying going wage rates, because it is the only foundation upon which a true profit sharing plan can be built.

In every request by the union for a wage increase we have laid our financial cards on the table as to how far we could go and why we couldn't go further. Letters sent to each employee have analyzed the effects of inordinate wage increases on the company's financial structure. Fixed expenses, operating costs, mortgages, taxes, and so on, and what's left over for profits have been explained in frank and simple language, so that everyone knows the problem of management in keeping the business on an even keel. This candid approach has been honored by acceptance of fair wage increases by the union. The company, in turn, has voluntarily awarded interim increases whenever better conditions justified them.

Following such an increase in June, 1948, the union asked if we could establish a set of conditions in the future that would allow for a further increase. This we did, by stipulating that the company must have a minimum of 10 per cent profit on sales before profit sharing. The reason for this: If we were to take out 25 per cent of the profit for profit sharing and 38 per cent for taxes, the balance was the minimum that was required for carrying on our business. We also agreed to watch the profits for the next three months, and if we maintain a profit of 10 per cent over that period, we would be able to give an additional 5 cents an hour. Thus in every discussion of wages or profit sharing our employees could not help but realize that not management, but the company's financial position, dictates what can be given.

Every Month...

AMONG THE ADVERTISING PAGES, these valuable aids to low-cost production: the plant operation man's guide to **WHAT'S NEW IN EQUIPMENT** (page 138) . . . a summary of **LABOR DEVELOPMENTS** (page 212)... things **YOU WANT TO KNOW** more about (page 204)

Keeping Score of Results

In order that our employees will always know exactly what the financial position actually is and what our expenditures are, each employee receives regularly a copy of the quarterly financial report that is prepared for stockholders. This is always accompanied by a letter of explanation. In it, distribution of profits is clearly shown.

But employees needed also to know the daily and cumulative score in pushing up the profits, if their interest and intensity of effort were to be sustained. Since profits bear an almost direct relation to shipments, a graph of shipments (see figure 1) is posted and kept current on all bulletin boards. Each day the value of shipments is added to the total. The resultant line can be compared against a bogey which approximates the total shipments that must be made before a profit can be realized. This graph serves for three months.

Also posted on all bulletin boards is a chart (see figure 2) entitled "Your Share of Profits." This chart coincides in period with the graph, and shows the total net profits for each month. It also gives total employees' share, and what that means in percentage of pay.

Further Benefits

Employees like the plan; the results bespeak that. How about the stockholders? As compared with 1940 when the profits were 6.3 per cent of sales (adjusted for present prices), profits in 1948 for the first five months averaged 11.7 per cent. After deducting profit sharing (which makes the figures comparable to 1940 our profits approximated 8.8 per cent. This improvement has been made despite an increase in our labor costs of 87 per cent as against a 39 per cent increase in the cost of our products.

Viewed as to productivity, the total volume of monthly shipments has increased 135 per cent, as against an increase in personnel in the same period of only 92 per cent. Much of the improvement can be attributed to the incentive of profit sharing.

LOOKING AHEAD IN LABOR

Last-minute round-up as we go to press

Unions won't strike for fourth-round wage increases until they see what Truman's steel wage board comes up with. Too many strikes have been lost already.

Management's resistance to further wage boosts while prices and demand fell, convinced labor's policy-makers this was not the time to strike.

Tip-off: When John L. Lewis, while negotiations lag, lets his miners work three days a week, without a contract. Conveniently he ditches his old cry: "No contract, no work."

Now the Ford strike threat is off until mid-August, probably September. Other auto, electrical, aluminum wage talks take the same turn.

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All, except perhaps Lewis, look for the steel board to bail them out on the fourth round. While board recommendations won't be binding, they'll be sure to carry great weight.

Some insiders in labor fear the board may let Philip Murray down. They recall how CIO fought the chairman, Carroll Daugherty, when he held wages down for the War Labor Board. Fact is, CIO tried to get him fired for being too tough.

Member David Cole, as arbitrator, only last month denied CIO newspapermen a wage increase at the New York *World-Telegram*. He felt business conditions didn't warrant it.

Third board member is Samuel Rosenman, FDR adviser. He has no past experience in wage disputes.

Experts close to the situation say Murray will lose on pension fight; his contract bars pension talks.

The board will grant social insurance, but have trouble justifying higher wages. Cost of living is down 4 points in the past year. A key factor: anticipated level of steel operations next year. The board must do some crystal gazing on steel business outlook.

As CIO president, Murray's stake in the board's decision is tremendous. He wanted the board, goaded steel operators into going along. So he'll be stuck with its findings.

If Murray loses, look for more talk about the next CIO boss: Walter Reuther.

Forget about any major change in Taft-Hartley for the next two years. Taft forced Democrats and organized labor to throw in the repeal sponge when he got his bill through the Senate. It revised the law, but kept the guts of it. Now House Democrats don't dare bring up the issue again.

So the fight on the labor law goes over until 1951 and the 82nd Congress. Meanwhile, the labor politicians get more excited about what they are going to do in next year's elections.

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Taft, of course, is the No. 1 target. He's a symbol of the labor law. Democrats have their own reasons for wanting to retire him. He's the biggest Republican threat in the next Presidential sweepstakes. And he's a thorn to Democrats in Congress.

Labor's yardstick for measuring a Congressman's fitness will be his vote on the Taft and Wood Bills. That puts 13 Senators and 217 Congressmen on labor's list of those who are to be purged.

Labor leaders aren't talking much about the only labor bill this Congress has passed: amendment to Wage-Hour Law killing "overtime on overtime."

There's still a chance that Congress will raise the minimum wage. But not to 75 cents.

Despite employer protests, Congress won't veto Truman's plan to shift employment and jobless insurance activities from the Federal Security Agency to the Labor Department. The Hoover Commission recommended the change.

AFL's building trades unions won't junk the jurisdictional disputes board set up to keep Taft-Hartley out of their fights. Failure to repeal Taft-Hartley decided it.

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Yes, some unions do praise employers. One so honored is the new Navy under-secretary, Daniel A. Kimball. The International Association of Machinists has cited Kimball for fine job in labor relations while boss at Aerojet Engineering Corp.

Organized labor's program for developing leaders continues to grow. More than 50 one-week summer school sessions are being held this year for some 5000 CIO members.

Local and shop leaders learn more about political action techniques, economics, collective bargaining. There's special training, too, for shop stewards and committeemen—so that they will be able to hold their own, or better, in dealing with your supervisors on the front lines.

LOOKING AHEAD IN BUSINESS

Last-minute round-up as we go to press

Production promises to gain, and business in general to carry on at a high level through 1949.

In fact, the outlook for industry is more cheerful than the record for the first half of the year.

It is based on three basic changes:

The "inventory slump"—which is estimated to have accounted for about two-thirds of the 13 per cent drop in production in the first six months—promises to reverse itself in early fall. Surveys, plus what statistics are available, indicate that most companies will have their inventories down to working minimums by September. Some lines—nonferrous metals, cotton print cloth, and rayon are among them—are already beyond the turn. Others expect to see new orders pick up in the months ahead.

Government is operating at a deficit. The federal budget is running at a rate of about $2.5 billion a year—and is rising. That is a substantial shot in the arm for business.

Banking policy—definitely anti-inflationary a year ago—is now inflationary, will help business expand. The Federal Reserve Board has seen *Regulation W* die, has loosened credit policies, now seems committed to using its powers to support business. On top of that, business has cut its debt in the first half, now generally is in a good financial position, so there is little danger of widespread liquidation.

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These things will all help business swing upward—and on top of them is the fact that business itself is showing a lot of strength.

Auto production has been hitting records, and promises to continue at a high level through the third quarter. Industry's capital expenditures are expected to hold up well, declining only 4 per cent in the third quarter from the second. With construction costs down, that means the physical volume of new plants and equipment is about the same now as it was a year ago. The construction industry itself expects to set new dollar records in 1949—with something like $19 billion of work finished during the year. Homebuilding is now running ahead of last year in number of units being started each month.

Retailers did almost exactly as much business in the first half of 1949 as in the record-setting first half of '48. Food lines, which make up 25 per cent of total sales, held even with last year, autos scored a 15 per cent gain. Building materials and home furnishings slipped off because the homebuilding season got underway later this year. Fall prospects: continuing good retail business. The $2.5 billion veterans' insurance dividend—to be paid early in 1950—will boost durable goods lines.

For business as a whole, the prospect adds up to good business for the rest of the year. *When the figures are in, the chances are that July and August will be the low months for production. September should see a turn-up—as it usually has since the war and because business will be reordering to maintain or build up inventories.*

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September and October, however, will bring three developments critical to business:

1. Labor settlements—which business now expects may turn on the recommendations for the steel industry developed by the President's fact-finding board. Whatever the settlement, it will have an important bearing on industry's cost trends and on the purchasing power of workers.

2. Prices—which show conflicting trends now. Wholesale prices generally have been headed down, but some raw materials prices are moving upward. The question: *Will prices level off for the year, or will they continue to drift down?* The size of this year's crops and what Congress decides about supporting farm prices in 1950 will have an important bearing on the cost of living. In fact, a decision to sustain farm prices at today's levels through next year might tend to hold living costs level, checking their downward drift.

3. Crisis abroad—Britain, with its dollar reserves dwindling, has announced that it will cut its buying from the dollar area—the United States and Canada—by 25 per cent. Sterling area countries—Australia, India, and the others—are following suit.

That is only a temporary answer to the British problem, however. Britain cannot cut its imports seriously for any length of time without depriving its industry of materials or cutting back living standards. And, even with a "standstill" on dollar purchasing, the prospects are that gold and dollar reserves will be steadily drawn down in the months ahead. Britain buys the bulk of its imports on long-term contracts that cannot be chopped off suddenly.

As a result, foreign affairs experts look for a new crisis in Britain this fall. With it will come basic decisions not only on Britain's internal affairs but also on trade policies. From the viewpoint of American business, the most important question may be export-import policy. Britain may tighten restrictions on imports, and extend her system of two-nation barter trade agreements. Or—under competitive pressure—she may turn toward free trade, begin to loosen restrictions.

Answers to these questions will affect the course of business in 1950. Meanwhile, the economic weathervanes point plainly to a pick-up in industrial production for the fall months.

OPERATING SHORTS

Readers are invited to contribute brief articles, illustrated when possible, reporting out-of-the-ordinary operating accomplishments. Accepted articles will be paid for

ANNUAL REPORT IS A PERSONAL REPORT to all stockholders of The Keystone Steel & Wire Company, Peoria, Ill. Above, member of Keystone's public relations staff explains 59th annual report to a stockholder in her own home. This new practice has paid off. Stockowners' interest in their company has grown. Share voting has increased to 81 per cent out of a possible 90 per cent. Many of the stockholders helped to develop new and desirable sales outlets as a result of their increased interest

Power and Air Supplied Through Floor

At the Woodward Governor Company, Rockford, Ill., all power and air services are supplied through the floor.

At the time the plant was built holes were pre-cast in the machine shop floor at intervals of six feet in both directions. When machines are moved to new locations, power and air services are available by removing a small brass plug.

Bus ducts for electric power and pipelines for air are located at convenient intervals near the ceiling of the basement area. Little time is required to hook up any machines with these services. Also, power and air to each machine can be shut off very quickly without disturbing those services to other machines.

Bringing services to the machines in this way makes possible easy adjustment of the height of the work area of each machine to suit the operator.

CHANNEL IRON shelves and a fork truck capable of maneuvering in limited space make for easy and efficient storage of production dies at Snap-On Tools Corporation, Kenosha, Wis. With this combination, high racks can be used, giving a maximum of storage space in a limited area. This mechanization of the die storage operation has resulted in the freeing of valuable floor space for other, more productive uses

Stockholders Shown Company Products

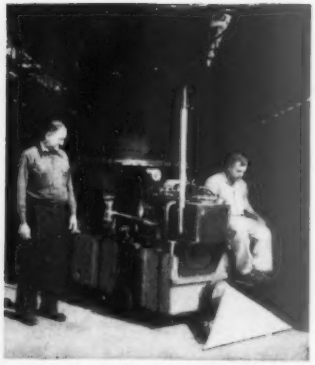
Better stockholder relations will result from a program just started by Reliance Electric & Engineering Company, Cleveland, if first response is any measure.

The new program consists of giving shareholders the opportunity of learning more at first hand about its products, their applications, and sales potentials throughout industry. It also gives them a chance to meet and talk with company personnel.

The plan works like this: When the company exhibits at industrial expositions around the country, stockholders in the area get personal invitations to attend. At the recent Coal Show in Cleveland, for example, nearly one hundred Reliance stockholders from northern Ohio visited their company's exhibit. They were welcomed by the president and saw the company's products. Their questions were answered. Company employees escorted them through the exhibits showing equipment powered by Reliance motors. Many stockholders made the trip a family affair.

SIGNS HUNG IN a central location in each department at Allison Division, General Motors Corporation, Indianapolis, identify departments and supervisors. Black lettering on a white background is easily readable. Signs include department number, name or function, and the names of departmental supervisors

A SIGN READING "We are now buying this part—Can we make it?" used on the bulletin board at Saginaw Steering Gear Division, General Motors Corporation, was reproduced in the June issue of FACTORY (page 136). Commenting on this item, Teer, Wickwire & Company, of Jackson, Mich., suggests that a similar sign be placed in the purchasing lobby, bearing the words, "We are now making this part—Can we buy it cheaper?" FACTORY thinks the idea a good one and has prepared such a sign, reproduced above. But FACTORY also suggests that use of such a sign need not be limited to the purchasing department. Unless supervisors, engineers, methods men, and designers are made aware of the possibility of savings through purchase of presently manufactured parts, they may not even consider asking the purchasing agent to get quotations. The question, "Buy or Make?" should be kept prominently in everyone's mind



AN OVERSIZE VACUUM CLEANER does the cleaning job at the Truck & Coach Division, General Motors Corporation, Pontiac, Mich. The vacuum is mounted on a powered unit and the operator of the machine drives it around to clean and sweep large floor areas in the plant. Use of the machine has minimized the number of janitorial sweepers, cut cleaning time by two-thirds. Men in the janitorial department like the sweeper so well they insists upon taking turns with it

Rotary Gathering Table Simplifies Job

JOHN GUMTZ, Supervisor, Circulation Section, Allis-Chalmers Mfg. Co., Milwaukee, Wis.

A rotary gathering table, 85-in. in diameter, is being used in the circulation section of Allis-Chalmers' advertising and industrial press department to expedite the assembly of multipage literature. The metal table accommodates 23 8½x11-in. sheets around its periphery. It is powered by a fractional horsepower motor mounted on the four-legged stand which supports the table. Speed of rotation can be adjusted. A portable foot-switch attached to an electric cord controls its operation. In the picture four girls are assembling a multipage insert for one of the company's publications, while seated at the table. For most operations, the table's highest efficiency is attained with from two to four workers. The job is being done better and faster.

Guide Helps Supervisors to Handle Grievances

Jack W. Taylor, Training Supervisor, Owens-Corning Fiberglas Corp., Huntingdon, Pa.

A small, two-page folder on handling of employee grievances has been distributed to all supervisors in this plant. Its purpose is boldly stated on the front cover, which bears only the title, "A Guide to the Successful Handling of Grievances." The rear cover is blank.

Prefaced with the reminder that "the *best* way to handle a grievance is to *prevent* it," the first inside page sets forth in a few sentences four general objectives of the grievance procedure: to maintain good relations with everyone involved; to build better relations; to upgrade the employee; and to settle each grievance fairly, justly, and satisfactorily. Then the point is made that every grievance presents an opportunity to achieve an improvement, followed by the challenge, "Make the most of it." Contrasting red and blue type on light blue paper is used to highlight the main points.

On the opposite page four steps are outlined, in about 50 words each, for proper handling of a grievance. These are headed: (1) Start It Right; (2) Get the Facts; (3) Weigh and Decide; and (4) Take Action. They suggest a friendly, open-minded, and calm attitude, which will encourage full discus-

sion of the basis for complaint, and careful collection of the facts.

If the facts show the supervisor to be wrong, he is told to admit it, but if right, to avoid humiliating the employee. In the latter event the case should not be considered closed until the employee is sure his position has been fully understood, and any possibility of left-over bad feelings has been eliminated. A specific suggestion to this end is thanking the employee for bringing up the problem.

All these suggestions are packed in short sentences totaling about 400 words, predominantly single-syllable. Typical of this style is the concluding punch line that tersely summarizes the company policy—"Not who is right, but *what* is right!"

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FORK LIFT TRUCK that can enter shipping vans with palletized materials has eliminated a handling operation on the loading dock at Griffith Laboratories, Chicago. Formerly, it was necessary to rehandle material, from platform into van, after it had been removed from 4-high stacks and brought to the loading dock by fork truck. The new truck does the whole job, from storage to van more efficiently

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Bar Graphs Made With Colored Cellulose Tape

Colored, pressure-sensitive cellulose tape is used to make attractive bar graphs at the Link-Belt Company's Philadelphia plant. Graphs dramatizing labor cost breakdowns for monthly reports, for example, are made from easily obtainable ¼-in. cellulose tape, applied to the graph paper between the upper limit and the base line. The bars are permanently attached, smudge-proof, glossy, and colorful. Little time is needed to apply the tape.

STEAM AND COMPRESSED AIR are carried to the main factory and condensate is brought back through a tunnel recently constructed at the Ivanhoe plant of the Perfection Stove Company, Cleveland, Ohio. The tunnel, 184 feet long, is made of waterproofed concrete, with steam, air, and water lines held to the walls by special angles on which rollers are mounted. Maintenance of the system is exceptionally easy because of the 5-foot working space between the pipelines, sufficient to permit entry of interplant trucks to lift pipe sections, when repairs are necessary

Simplified Suggestion Forms Save Time

When Standard Register Company, Dayton, Ohio, found that clerical procedure resulted in a bottleneck which delayed the investigation of suggestions, a new and simpler suggestion form was adopted, with very satisfactory results.

Under the old system, a one-sheet suggestion form was filled out by the employee, a secretary assigned a control number and typed an acknowledgment card, with date received and control number hand-stamped on it. This was placed in an envelope on which the suggestor's name and department number were typed. Then the entire suggestion was retyped on a 3-part carbon-interleaved form, providing a file copy for the suggestion secretary, a copy for the industrial engineering department, where suggestions are evaluated, and a copy for the information of the division head concerned. This meant a great deal of clerical effort, as well as a delay before actual consideration.

Under the new system all of this typing has been eliminated. The new form consists of two sheets, interleaved with one-time carbon paper. On the first sheet is printed promotional material, with a detachable stub (to be returned to the suggestor) at the bottom. The second sheet is tracing paper, and carries investigating routing information in place of the promotional material. The remainder of the two sheets is left blank, for the suggestor's description of the old method and the improvement he is suggesting.

When the suggestor writes on the first sheet, a good black copy is produced on the tracing paper, which is used for ozalid reproduction. The original form is used for investigation, after the stub has been filled in with date and control number and returned to the suggestor. The carbon is used for filing and control, and ozalid copies are distributed to the president and the division heads.

Under the new system, instead of the previous two-weeks delay before investigation, which was not uncommon because of the amount of clerical work involved, suggestions are acknowledged and placed in investigation on the same day they are received.

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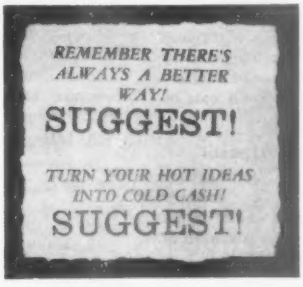


LETTER STAMPS are used to stimulate the interest of employees in the suggestion system at American Greeting Publishers, Cleveland. The stamps are used on all interdepartmental messenger service envelopes, correspondence leaving the suggestion department, and weekly pay envelopes. Two of the slogans now being used are shown above

maintenance data sheet 163

Fire Protection During Plant Shutdowns

WHENEVER A PLANT must shut down for more than a day or two—whether for vacation closings, long week ends, strikes, or for any other reason—proper safeguards against fire take on added importance. There will be few employees present to discover and handle any fires which start. Consequently, everything possible should be done to eliminate sources of fire, and to keep fire protective equipment ready for immediate action.

The fire safety of the plant depends primarily on whatever men remain on duty—the plant protection force, watchmen, maintenance workers, supervisors, or executives—and they must be prepared to act effectively in case fire breaks out. More dependence than usual must also be placed on the public fire department. Notify fire department officials in advance of the shutdown and arrange a definite plan of procedure for fire or other emergencies.

Listed below are a number of items requiring attention. They are arranged as a convenient check list to help assure that any precautions that may be needed will not be overlooked.

Getting the Plant Ready

Do everything possible to eliminate sources of fire. Leave the plant thoroughly CLEAN. Shut down hazardous processes carefully. Shut off electric and other power, except where needed for fire pumps, lighting, and other services essential to the idle plant. Prohibit or strictly regulate smoking. The consequences of careless smoking while the plant is shut down can be very serious.

Housekeeping and Waste Disposal

1. Remove and safely dispose of combustible waste material from buildings and from the yard and especially at machines, under tables or benches, under stairways, and in machine or elevator pits.

2. Clean lint or combustible deposits from machines, floors, beams, walls, ceilings, and fixtures.

3. Remove flammable residues from ovens, spray booths, hoods, and ducts.

4. Pay particular attention to cleanliness of storage areas. Make sure that sprinklers are unobstructed by high-piled stock and that liberal aisleways have been maintained.

NOTIFY YOUR INSURANCE COMPANY:

When vacation or other extended plant closings are planned.

When strike threatens.

If a strike interferes with watch service or maintenance of fire protection.

If fire protective equipment is shut off or impaired in any way.

Flammable Liquids

5. Remove liquids from dip, cleaning, and mixing tanks. If this cannot be done, cover tanks tightly.

6. Relocate any storage of liquids at processes or in exposed service tanks to buried tanks or to tightly covered containers in a safe, sprinklered storage area.

7. Relocate drums of liquids to safe storage areas, preferably in detached buildings.

8. Shut discharge valves on butane or propane storage tanks (unless used for heating).

9. Shut off pumps supplying fuel oil under pressure to plant distribution piping, except where needed for building heating.

10. Make sure that gage glass valves are shut.

11. Prevent improper vapor leakage by keeping tanks tightly closed.

Flammable Gases

12. Make sure that individual burner valves and the main valve for each heating equipment unit are shut off.

13. If possible, shut off main valves outside buildings or at meters.

14. Disconnect cylinders at manifolds.

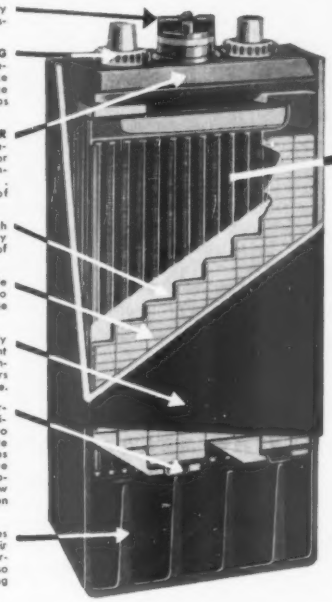
15. Reduce number of portable cylinders in main buildings to a minimum.

Continued on page 136

EXIDE-IRONCLAD BATTERIES ARE DIFFERENT!

They are specially designed to provide years of dependable service in all MOTIVE POWER WORK

Storage batteries are called upon to perform many tasks. No single type of battery is adequately suited to all. To meet these numerous requirements, Exide engineers have developed special types, to fit each application.* Among these several types is the specially designed Exide-Ironclad Battery. Details shown below.


VENT PLUG specially designed to prevent escape of electrolyte.
GREASE SEAL RING NUT holds battery elements securely in place . . . prevents creepage of electrolyte . . . keeps tops clean and dry.
SEALED CELL COVER flush with top of jar. Prevents collection of dirt or moisture . . . keeps impurities out of cell . . . eliminates leakage of electrolyte.
SEPARATOR of high porosity, specially treated to last the life of the battery.
NEGATIVE PLATE made extra heavy and built to match the long life of the positive plate.
JAR made of specially tough and durable Giant Compound. Built to withstand the jolts and jars of hard industrial usage.
FEET. Internal short circuits practically eliminated because the two feet on negative plate rest on different ribs from those of the positive plate, and because separators extend below both plates and rest on all four ribs.
RIBS support all plates and separators. Their height provides generous sediment space so that internal cleaning is unnecessary.

DIFFERENT IN DESIGN

DIFFERENT IN CONSTRUCTION

DIFFERENT IN SERVICE QUALITIES

Chief among these differences is the unique positive plate, an exclusive Exide feature.

EXIDE-IRONCLAD POSITIVE PLATE

Consists of a series of finely-slotted tubes which contain the active material. So small are these slots that, while permitting easy access of electrolyte, they retard the active material from readily washing out or jarring loose . . . adding considerably to life of plate.

Exide-Ironclad Batteries have ALL FOUR of the characteristics that a storage battery must have to assure maximum performance from battery electric industrial trucks — high power ability, high electrical efficiency, ruggedness and a long life with minimum maintenance. The combination of these four Exide-Ironclad characteristics assures years of dependable day-in, day-out service.

"Exide" and "Exide-Ironclad" *Reg. Trade-marks U. S. Pat. Off.*

*

DESIGNED FOR STATIONARY USE

The Exide-Manchex Battery has the manchester type positive plate with the lead button construction. Specially designed for stationary use in many classes of industry.

DESIGNED FOR AUTOMOBILE USE

The Exide Automobile Battery has plates of staggered grid construction. Specially designed for use in automobiles, trucks, buses, aircraft and numerous other applications.

1888...DEPENDABLE BATTERIES FOR 61 YEARS...1949

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • *Exide Batteries of Canada, Limited, Toronto*

maintenance data sheet 164

Fire Protection

Continued from page 134

Electric Power

16. Maintain lights in service.

17. Maintain power for fire pumps, oil burners, and possibly elevators.

18. Open switches (at main switchboard if possible) on all circuits that will not be in use.

19. De-energize transformers, except those providing power for fire pumps, etc.

Steam Power and Heating

20. Maintain sufficient steam to heat buildings and supply fire pumps.

21. Take special care to prevent freezing of automatic sprinkler systems. (See also Factory Mutual Bulletin 2.91.)

22. Make sure all steam control and relief valves are in good operating condition.

23. Provide for emergency boiler water feed if there is none.

Organizing Special Watch Service

Constant and competent watch and guard service is of great importance. The safety of the plant depends on the watchman or plant patrolman most of the time that the plant is shut down.

24. Maintain standard recorded watch rounds 24 hours a day.

25. Make sure that watch routes adequately cover the plant.

26. Re-examine watchmen and plant patrolmen to test their knowledge of the protective equipment and of their regular and emergency duties.

27. Thoroughly train any substitute or extra men who are temporarily employed.

Checking the Protective Equipment

Because prompt discovery of fire is less certain when the plant is not operating, more reliance must be placed on the automatic fire protection systems. Therefore, thorough and frequent inspections to make sure that the equipment is in readiness assume an even greater-than-usual importance.

28. Inspect every sprinkler valve to be sure that it is open, sealed, and accessible, and record conditions in detail.

29. Check all the other protective equipment—dry pipe valves, sprinkler alarms, fire pumps, tanks and other water supplies, hydrants and hose equipment, hand extinguishers, fire-doors—and correct any defects.

Precautions During Alterations or Repairs

Vacation closings are frequently utilized for maintenance work and alterations which cannot be conveniently carried out while the plant is operating. Such work, unless properly safeguarded, can introduce serious fire hazards.

30. If cutting or welding is to be done, appoint a competent supervisor. Use written permits for the specific work to be done. Avoid welding in the vicinity of combustibles, unless the material can be protected adequately from sparks. Station extra men with small hose or extinguishers to watch for sparks. Always keep sprinklers in service while cutting or welding. (See Factory Mutual Bulletin 11.30.)

31. If alterations require shutting off the sprinkler system, obtain permission in advance from the insurance company. Use "Sprinkler Valve Closed" tags (red tags). Shut off as small an area as possible. Keep a man stationed at the closed valve ready to open it at once if fire breaks out. Push work vigorously to completion. Do not leave sprinklers shut off overnight. (See Factory Mutual Bulletin 2.12 for additional precautions.)

If furnaces, ovens, and other equipment involving flammable liquids or gases are to be installed or rearranged, guard against fire and explosion hazards. Freely consult the insurance company beforehand in any cases requiring special advice.

MAKING READY TO RESUME

Protective Equipment

32. Be sure all fire protective equipment is in order. Make flow tests from sprinkler riser drains and sprinkler system test connections.

33. Test all automatic protection and safety devices.

34. Before starting machines, check lubrication, cooling, and adjustments.

Gas Equipment

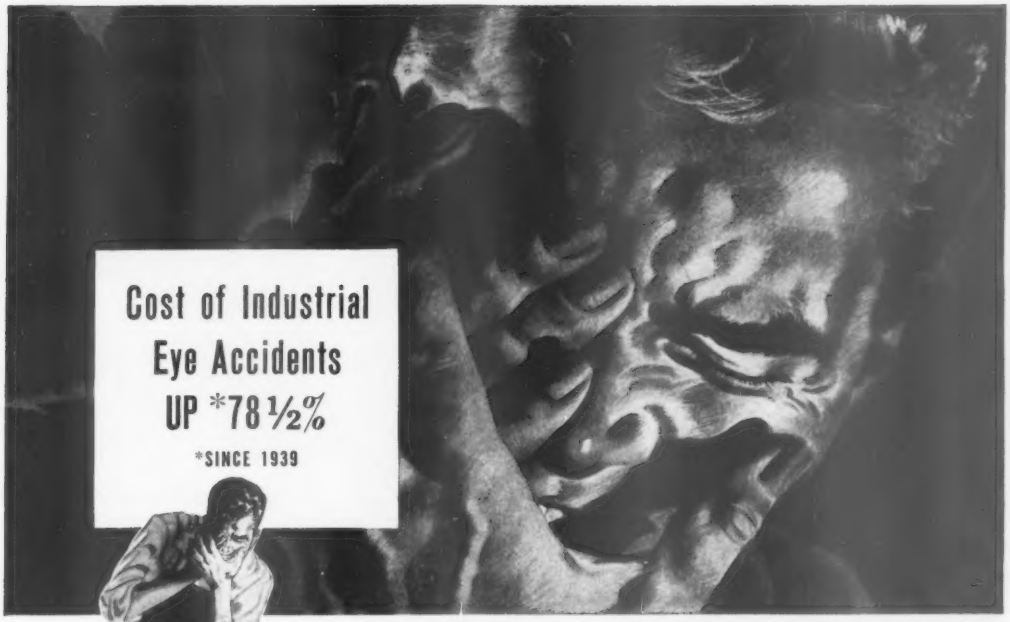
35. Make sure all burner valves are shut before opening main gas valves.

36. Ventilate equipment thoroughly.

37. Assign only experienced burner men to light-off equipment. Follow established safe procedures.

Electrical Equipment

38. Open motor control switch at each machine before closing feeder switches.



You Can Give
this High Cost
the "Disinflation Treatment"

NOW!

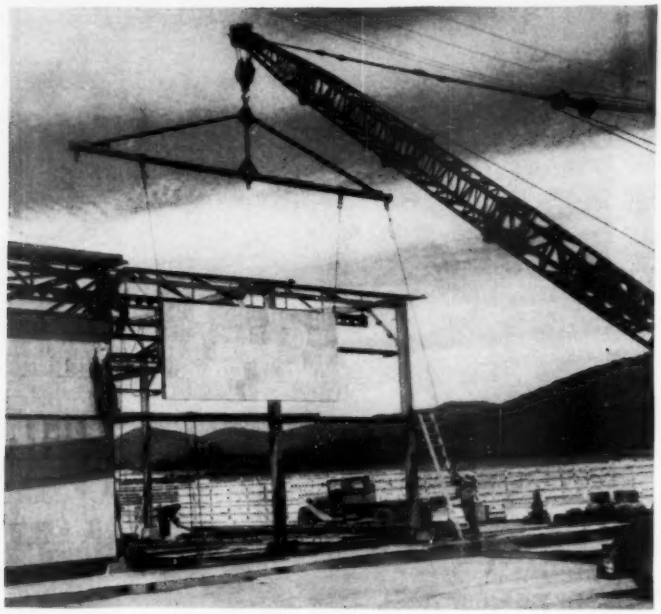
When tightening up operations, don't fail to examine the costs of eye accidents. In addition to their DIRECT costs which range from $15 to sums in four figures, the HIDDEN costs can be a severe drain on profits. These include lowered production due to substitution of inexperienced workers for key men, impaired shop morale, abuse of equipment by "green" operators, the invitation of additional accidents to eyes, limbs and body through unfamiliarity with work processes. Adequate eye protection programs have saved these needlessly high costs in plant after plant by preventing 98% of all eye accidents . . . at a nominal outlay. Ask your nearest AO Safety Products Representative to call with facts and figures.

American Optical COMPANY *Safety Products Division*

Southbridge, Massachusetts
Branches in Principal Cities

WHAT'S NEW IN EQUIPMENT

Briefed here—for the convenience of plant operating men—are descriptions of industrial plant equipment newly placed on the market



Concrete Building Slab

Structural slab panels, called Strestcrete, are composed of precision-ground concrete units fabricated so that edges may be secured together with pre-stressed steel bars positioned in recesses or grooves built into the units. Slabs and panels of various thicknesses from 3 to 12 inches may be assembled in widths up to 8 feet. For roof construction, slabs are made to span 32 feet without intermediate supports. Tongue-and-groove siding, stud walls, and roof and floor slabs are also available, assembled to customer's specifications. Basalt Rock Co., Inc., Strestcrete Div., Napa, Calif.

A.C. Load Visualizer

Combining five instruments in one, according to maker, a.c. load visualizer serves as a standard 0-2.5/5/25/50-amp. ammeter and a 0-150/300/600-volt voltmeter. It can also be used with a split-core or conventional instrument transformer to extend the range for determining watts, vars, volt-amperes, and power factor. Designated as the Type AF-2, device can be applied in load surveys, induction motor tests, reactive power studies, and power factor checks in power and lighting circuits. It is self-contained to 50 amperes, extensible to 1000 amperes by split-core current transformer. This provides a hook-on feature, enabling surveys to be made without interrupting service or cutting conductors. It measures 6¼x8x4 inches, is furnished in kit including voltage leads, instruction cards, calculator, and felt-lined carrying case. It is magnetically damped, fully shielded, and equipped with an external zero set; all readings are made on one dial. Meter and Instrument Divs., General Electric Co., Schenectady 5, N.Y.

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Amplifying System

Paging and music distribution system uses a Knight 30-watt amplifier and two 20-in. reflex trumpets. Under average noise conditions, the system will cover up to 100,000 square feet, according to manufacturer, who states that the amplifier features extend frequency response on both phonograph and mike channels for clear paging and reproduction of music. Hum level is 79 db. below rated output. Speaker output impedances are 4, 8, 16, 250, and 500 ohms, plus a 70-volt output. Mike and phonograph channels can be mixed, permitting announcements without cutting off music. 3-speed phonograph top is optional; plays 78, 33 1/3, and 45 rpm. records. Allied Radio Corp., 833 W. Jackson Blvd., Chicago 7.

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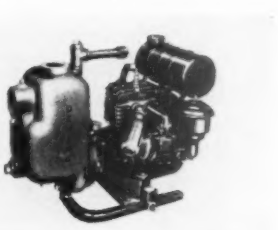
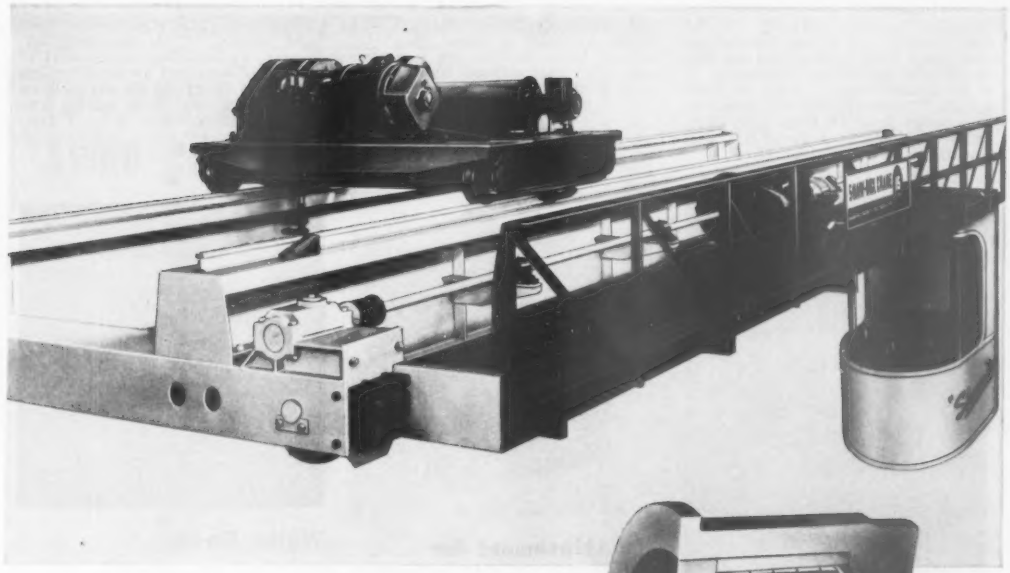
Neoprene Hose

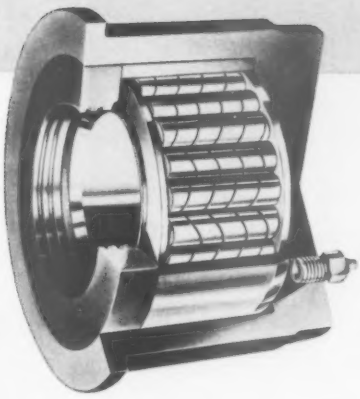
Single-line hose, neoprene-lined, in ¾-in. and 1-in. sizes, is suitable for applications such as heavy cutting, decarburization of steel, and large scrapping operations, as well as in oxygen pipe line installations. Can be used at working pressures of 200 psi., according to manufacturer. Available in 50-ft. lengths. Air Reduction Sales Co., 60 E. 42nd St., New York 17.



Portable Self-Priming Pump

Designed for drainage or water-handling jobs where electric power or belting facilities are not available, self-priming centrifugal pump is equipped with a 1½-hp. 4-cycle air-cooled engine having a high tension magneto. Identified as Fig. 3304, pump has cast-iron casing, bronze





Features of this *"Plus Value"* Crane include HYATTS

Manning, Maxwell & Moore has made available to industry a new heavy duty overhead electric traveling crane.

They call it the Shaw-Box Type "SB" "Plus Value" crane because of several important features, not the least of which are the Hyatt Roller Bearings at all vital bearing points. Fitting Hyatt Bearings in a cartridge, as shown above, eliminates distortion of the bearing races and keeps the grease in and dirt out.

Experience has taught that the application of Hyatt Roller Bearings is one way of insuring "plus value" in the equipment you build, buy or sell. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

HYATT ROLLER BEARINGS

impeller mounted directly on the engine shaft, and a mechanical-type shaft seal. Pipe connections are 1½-in. suction and 1½-in. discharge. It is 20 inches long, 13 wide, 19 high, weighs 83 pounds. Performance ratings range from 10 gpm. with 80-ft. head to 90 gpm. with 15-ft. head. The Deming Co., Salem, O.

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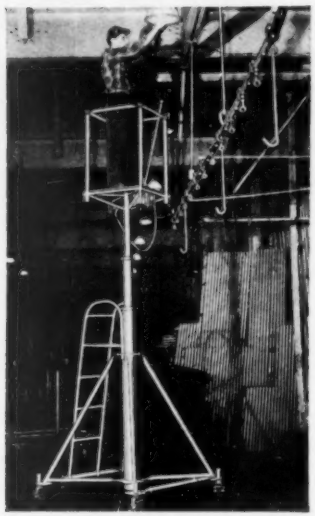

Rolling Maintenance Tower

To facilitate overhead maintenance, hydraulically-raised manually-operated rolling work tower is designed for one-man operation. Controlled from the work platform, it may be raised or lowered rapidly by means of hydraulic power so that work may be performed at any platform level from 7 to 17 feet above the floor. An integral tubular steel ladder with handrails provides access to the work platform when it is in retracted position. The tower may be rolled to any location on large swiveling rubber-tired casters. A guard rail, 2 feet, 9 inches high, protects the worker while on the platform and provides a place to hang equipment. To clear low doors, the rail may be lowered by pulling lock-pins at the four corners. Base of tower measures 4 feet, 3 inches square; safety brake on each caster locks both the wheel and the swivel to secure the tower while in working position. Safway Steel Products, Inc., 6228 W. State St., Milwaukee 13.

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Flexible Abrasive

Molded in stick form for cleaning and polishing metals, fine-grain abrasive material is held together by a flexible bond. When held against a turning commutator it removes high-resistance film, dirt, and grease. Because it is nondusting, it does not affect the face of the brush or fill commutator slots, according to maker, who states that it can be used while the motor or generator is in operation, as it is nonconductive and nonloading. May be used to remove tool marks, scratches, or rust, and leaves a highly polished finish on copper, brass, bronze, steel, aluminum, and other metals. Ideal Industries, 1416 Park Ave., Sycamore, Ill.

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Fan Attachment for Relative Humidity Indicator

Small motor-operated fan, developed for use with manufacturer's relative humidity indicator, moves the air over the indicator's wick in sufficient volume to give stable readings within 30 seconds, according to maker. Powered by dry-cell batteries, it is said to make possible analysis of humidity conditions even in confined spaces, or in operating machinery, to facilitate adjustment of the humidifiers and air conditioning equipment. Readings are obtained on a simplified slide rule, making calculations unnecessary. Weston Electrical Instrument Corp., 617 Frelinghuysen Ave., Newark 5, N. J.

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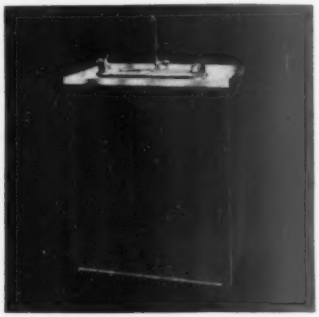
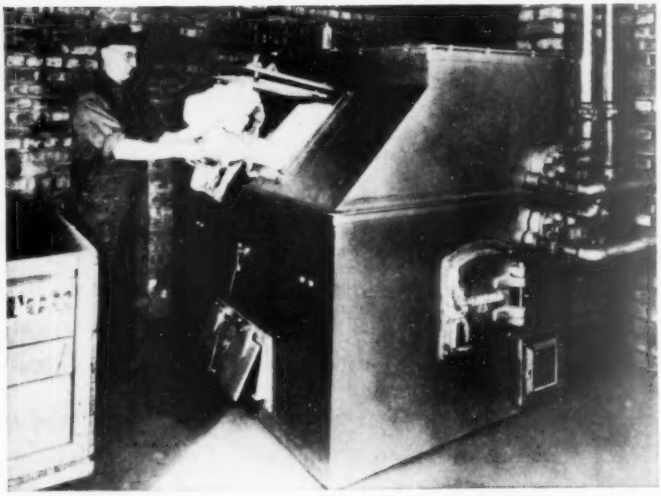


Water Cooler

Designed for service in locations where cold water requirements are heavy, both for drinking and for saturating cold towels worn by workers to combat heat, "Steel Mill" water cooler features an integral filter-dechlorinator said to remove chlorine and other tastes and odors, and to eliminate rust and sediment. Stainless steel top is equipped with



Water Heating Unit

Designed to be used with manufacturer's portable incinerator, water heating unit uses refuse as fuel. Capacity of single unit ranges from 50 gph. with the 24-in. incinerator to 100 gph. with the 48-in. Capacity figures are based on raising the temperature of the water from 40 to 140 deg. F. on a minimum of 1200 deg. F. furnace temperature over the heater. Hot water delivery may be doubled, according to manufacturer, by installing double unit. Plibrico Jointless Firebrick Co., 1800 Kingsbury St., Chicago 14.

INCREASE EFFICIENCY, AVOID COSTLY MISTAKES WITH *TelAutograph* TELESCRIBERS!

Sends Written Messages Via Wire *Instantly* to One or More Points . . . From Dept. to Dept. or Bldg. to Bldg.

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Write TODAY for folder describing how TelAutograph Telescribers can increase efficiency and accuracy, and reduce operating costs in YOUR organization. There's no obligation.

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"Handwritten Messages Deliver Themselves... While You Write."

two stream-height controlled bubblers, and may be obtained with an auxiliary faucet for filling containers and saturating towels. Filtrine Mfg. Co., Dept. CH, 53 Lexington Ave., Brooklyn 5, N.Y.

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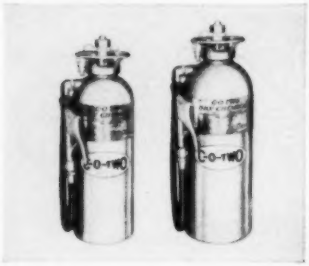

Dry-Chemical Fire Extinguisher

Self-contained fire extinguisher uses a free-flowing dry chemical which is nonconducting, noncorrosive, nonfreezing, and nontoxic. Discharge hose and nozzle remain empty until the extinguisher is actuated, which is said to eliminate clogging. Effective on flammable liquid and electrical fires, it is available in 20- and 30-lb. capacities. C-O-Two Fire Equipment Co., Box 390, U.S. Highway 1, Newark 1, N.J.

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Explosion-Proof Intercom System

Electronic intercom system was developed for use in plants where the atmosphere in work areas contains highly flammable and explosive gases or vapors. It is fully selective, and permits stations in hazardous areas to call other stations in either hazardous or nonhazardous areas. "Remote reply" feature permits the person called, whether in a hazardous or safe area, to answer from any reasonable distance without stopping his work, approaching the station, or using his hands to manipulate any switches. Any number of stations may be used in the system; a busy signal is provided to indicate that the system is in use. Maximum flare diameter of the trumpet is 10 inches, with a 24-in. air column; over-all length is approximately 12½ inches. The station measures 6x6½x3½ inches. Each system is planned to meet specific operational and layout needs of the plant involved. Executone, Inc., 415 Lexington Ave., New York 17.

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Portable Electric Saw

Thor Silver Line portable electric saws feature long-shaft transverse motor mountings. Six models range from 6- to 12-in. sizes. Features include die-cast aluminum housings, reinforced and protected to withstand rough handling; steel inserts for bearings and threads to maintain alignment; built-in saw blower which keeps cutting line clear and motor free from dust. Steel rip guide adjusts for any thickness; automatic ball-bearing blade-guard has rubber snubber. Independent Pneumatic Tool Co., 175 N. State St., Aurora, Ill.

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Small Arc Welder

Operating from a 110-volt light circuit, small arc welder is intended for use in repairing and fabricating light-gage metals. Called the Lincwelder 60, it has a maximum output of 60 amperes, and may be used for joining strap, pipe, tubing, angle, and other shapes, for cutting metals, soldering and making wire connections, brazing, heating for bending, and, with a small rectifier, for battery charging. It weighs approximately 50 pounds, can be carried by its handle for use wherever needed. The Lincoln Electric Co., 12818 Coit Rd., Cleveland 1.

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Crane Cab Air Conditioner

For air conditioning crane cabs exposed to fumes, gases, dirt, and excessive temperatures, Little Giant unit filters, cools, or heats the air. Measures 38x17x48 inches, and is available either as a self-contained unit (illustrated) to be located either inside or outside the cab, or as a split unit, with the condenser unit outside the cab and a relatively small cooling unit located inside. The Lintern Corp., 29-2 Riverside Dr., Berea, O.

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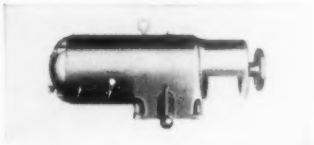


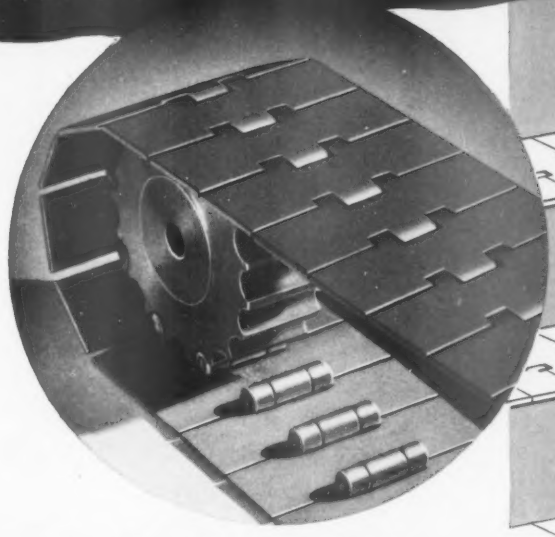
Gearshift Drive

Multi-speed gearshift drive, Type R4, is a self-contained unit combining an integrally mounted motor and a 4-speed transmission. It is

Portable Belt Conveyor

Intended for loading and stock-piling free-flowing bulk material, Model 362 18-in. portable belt conveyor has a capacity up to 100 tons per hour, according to maker. Special belt carriers and slow-speed drives are available for handling bags, bales, and boxes, up to 100-pound units. Available with casters, flat belt, screens, pneumatic tires, flexible speed variation belt, cleated or plain belt, it is adaptable from single- to three-roll carrier, for medium-duty conveying. Barber-Greene Co., Aurora, Ill.

For Conveying Small Containers, Packages and Parts . .



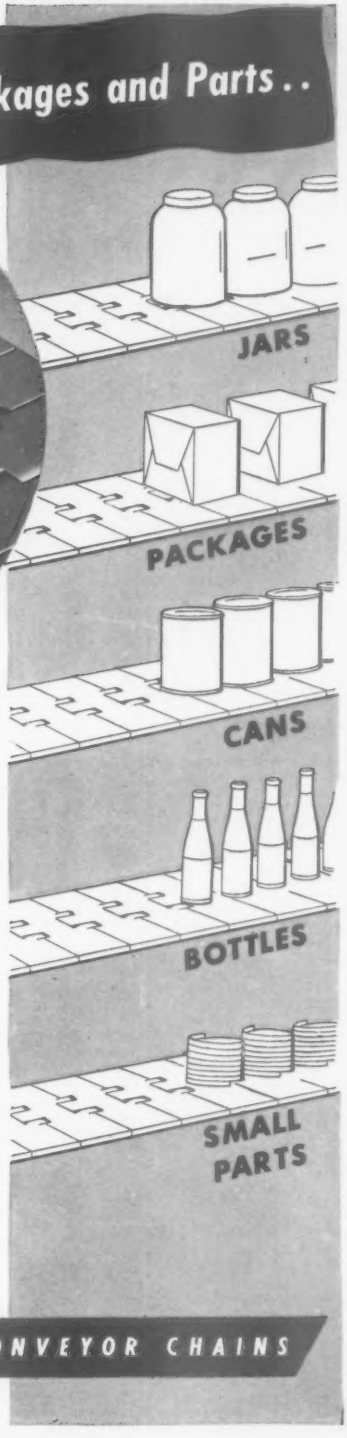


TABLE TOP IS TOPS!

Small parts and packages . . . bottles, cans and jars, Rex Table Top offers the most efficient, economical and convenient method of materials handling.

Available in both stainless and case-hardened steel, Table Top is a natural for moving small parts through heat-treatment ovens and other processing steps. Its continuous carrying surface, provided by the exclusive interlocking hinged joint construction, assures smooth, steady, tip-free conveying for bottles and jars. There's no expensive breakage and spillage with Table Top on the job.

Rex Table Top Conveyor Chain is simplicity itself. A one-piece platform link and a pin are the only parts. There are no attachments to loosen or "wobble" . . . no pockets to catch and hold foreign material. Sprocket tooth bearing pressure is spread over the entire length of the joint . . . giving unusually wide bearing area. Pin is relieved of all load when flexing because each sprocket tooth contacts both leading and following links simultaneously. Table Top just has to last longer.

For all the facts, send for your copy of Bulletin No. 47-15. Chain Belt Company, 1667 West Bruce Street, Milwaukee 4, Wis.

CHAIN BELT REX COMPANY

. . . DRIVE AND CONVEYOR CHAINS

designed to motorize individually machine tools formerly driven from lineshaft. Gear ratios are: 4 to 1; 2 to 1; 1.33 to 1; 1 to 1. Units are built with four speeds in ratings of 3 hp. at 800 rpm. to 10 hp. at 1800 rpm., with eight speeds in ratings of 1½ hp. at 1200/600 rpm. to 5 hp. at 1800/900 rpm.; reversible in all speeds by using a reversing control. Various electrical and mechanical modifications available for special applications. The Lima Electric Motor Co., Dept. AA 74, Lima, Ohio.

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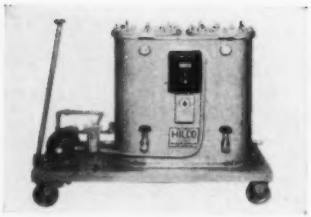
Chronometric Tachometers

For use in precise measurement of rotative and surface speeds of motors, engines, generators, wheels, belts, and similar equipment, chronometric tachometer times the test period to exactly six minutes. The number of revolutions per minute is read directly from the dial. Suitable for use in laboratories, power plants, pumping stations, and other places where speeds must be determined exactly, they are said to retain their accuracy under extreme climatic conditions as well as in a magnetic field. Two models are available: Model 944, for speeds to 1000 rpm., includes 90-deg. male and 60-deg. female center tips. Model 145, for speeds to 10,000 rpm., includes 90-deg. male and 60-deg. female center tips and a 6-in. circumference wheel tip. Both are supplied in a shockproof, neoprene-lined steel case that is both moisture- and dust-resistant. Technical Oil Tool Corp., Ltd., 1057 N. La Brea Ave., Los Angeles 38.

•

Air Exhaust Muffler

Developed to eliminate objectionable noise and prevent discharge of oil and water vapor on workers and surrounding area, air exhaust muffler, called Atomuffler, ranges in pipe sizes from ⅛-in. to 1½-in. Its construction is such that there is no direct burst of air, eliminating accidents from flying particles. Typical applications are air chucks, air vises, machine tools. Allied Witan Co., 606 Williamson Bldg., Cleveland 14.



Portable Oil Filter

Portable oil filter, Model FA-2X, is arranged so that it may be wheeled up to diesel engines or other equipment containing lubricating oil requiring periodic filtering. Unit consists of a filter assembly with or without electric heaters, contains one or more filter cartridges. The cartridges can be packed with fuller's earth for filtering straight-run mineral oils, or with cellulose for heavy-duty or compounded oils. Entire unit is assembled on a base with rubber-tired ball-bearing casters, and with a draw bar for moving the unit. The Hilliard Corp., 102 W. 4th St., Elmira, N.Y.

•

Strap Cutter

Heavy-duty strap cutter is intended for use on ¾-, 1¼-in. 0.035, and 1¼- and 2-in. 0.050 high tensile steel strapping. Manufacturer states that it is of sturdy construction with a flat lower jaw to allow operator to cut strap quickly and accurately. The Brainard Steel Co., Warren, O.

•

Round-Bottom Tilting Dump Box

Adapted to the handling of small parts, bulk material, or scrap, portable dump box is constructed of reinforced heavy sheet steel. Hand holds provide for tilting the box 90 degrees; round bottom facilitates unloading as well as cleaning. Safety catches hold the box securely at loaded or tilted positions. Burke Bartlett Co., Inc., 708 Stephenson Bldg., Detroit 2.

•

Shaper

Eight-inch shaper is made to handle straight or angular cuts, squaring, machining, and slotting. An 8½-in. maximum stroke permits machining of work 8 inches long. Six automatic feeds in either direction, from 0.002 to 0.012 of an inch, may be set by a feed dial with readings graduated in thousandths. Variable speeds, from 35 to 180 strokes per minute; feed may be reversed, and speed changes effected by handwheel control. 8x8-in. square table has a vertical travel of 5½ inches and a 10½-in. traverse. The adjustable table support mounted on the base of the machine provides reinforcement and eliminates chatter or vibration on heavy cuts. Tool head may be swiveled 360 degrees to square the ends of stock of almost any length, according to manufacturer. Logan Engineering Co., 4901 W. Lawrence Ave., Chicago 30.

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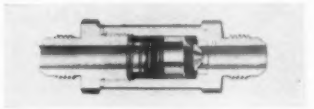

Check Valves

Cone-type check valves are intended for use where there are high pressures, extreme temperatures, corrosive fluids, and severe operating conditions. Pressure drop in sizes ¼ to 1 inch is said to average 10 psi., and checking time less than half a second. Standard models have aluminum bodies for pressures up to 1500 psi., tube connections from ⅛- to 1-inch O.D. Other models for high or low opening pressures, internal or external thread connections, may be obtained on order. Kohler Co., Kohler, Wis.

•

Hydraulic Control Valves

Control valves, Series V8, are intended for use in large volume oil-hydraulic systems in heavy-duty industrial equipment and hydraulic presses. Valve will handle 80 gpm. at operating pressures up to 1000 psi. Various models are available for operating up to as many as three

CENTRIFUGAL BLOWERS...

PRODUCTS OF *R-C dual-ability*

This new bulletin gives you the latest information on Roots-Connersville Centrifugal Blowers and Exhausters. It includes characteristic performance curves; details and illustrations of R-C units, both single-stage and multi-stage; data on regulation and control; and other pertinent facts to help you specify blowers or exhausters. Ask for Bulletin 120-B-14.

It is a companion piece to the two bulletins described at the right. Together, these make up the "R-C *dual-ability team*"—the only source from which you can obtain both Centrifugal and Rotary Positive Blowers and Exhausters.

You should have all three in your data files and they will be sent on your request.

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Rotary Positive Blowers—details on design and construction of R-C Rotary Positive Blowers; characteristic performance curves and other helpful data. Ask for Bulletin 22-23-B-13.

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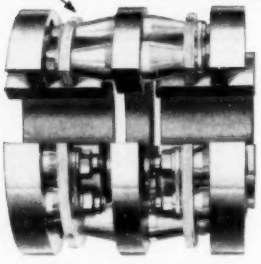

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single- or double-acting hydraulic cylinders. Hollow-plunger construction features built-in check valves and adjustable differential-type relief valves. Hydraulic Equipment Co., 1100 E. 222nd St., Cleveland 17.

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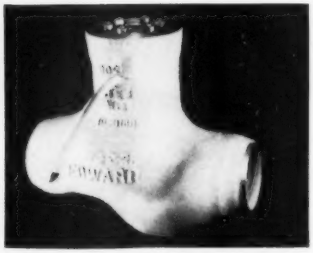


Small Check Valve

Developed to make possible small check valve installations, cast steel valve body is said to reduce pressure loss 40 per cent as well as to save space, reduce weight, and cut wear-producing turbulence. Integral Stellite seat and equalizer allows the disk-piston to rise completely out of the path of flow, utilizing the entire flow passage. Edward Valves, Inc., E. Chicago, Ind.

•

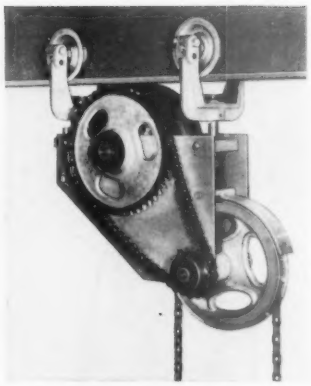
Water Cooler

Adaptable to service where severe atmosphere and humidity prevail, and where absolute cleanliness is important, water cooler is made with panels of heavy-gage stainless steel with electrolytic polish. Top also is of stainless steel, as is the cold water storage tank, in which all seams are electro-hydrogen welded. Cordley & Hayes, 443 Fourth Ave., New York 16.

•

Control Valve

Line of small single-plunger valves, known as Series O and OE, features simple design, sturdy construction, and ease of operation, according to maker. Suitable for use with manually controlled presses, pilot circuits, and in other processing cycles where frequent manual operation is required. Valves are balanced and will remain in position until changed. A spring can be mounted between the pushbutton and gland nut when spring-return action is desired. Flow is through the plunger and around, not through, the seals. Manufacturer states that valves can be completely disassembled for repacking, and reassembled in a few minutes without disturbing the connecting piping. C. B. Hunt & Son, Inc., Salem, O.



Monorail Drive Unit

Compact drive unit, for propelling monorail carriers along overhead track, operates by means of a hand-chain and sprocket arrangement. Loads up to track capacity can be moved at the rate of one foot per each 28½-in. overhaul of the hand chain, according to the manufacturer. Designed for use where electric power operation is inaccessible, it may also be used where tractor movement of a load is advisable because of high elevation of track, precision spotting of load, or excessive weight. American MonoRail Co., 13190 Athens Ave., Cleveland 7.

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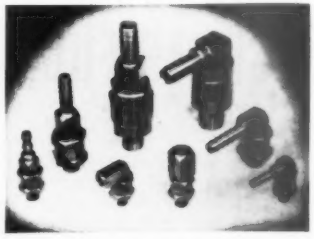


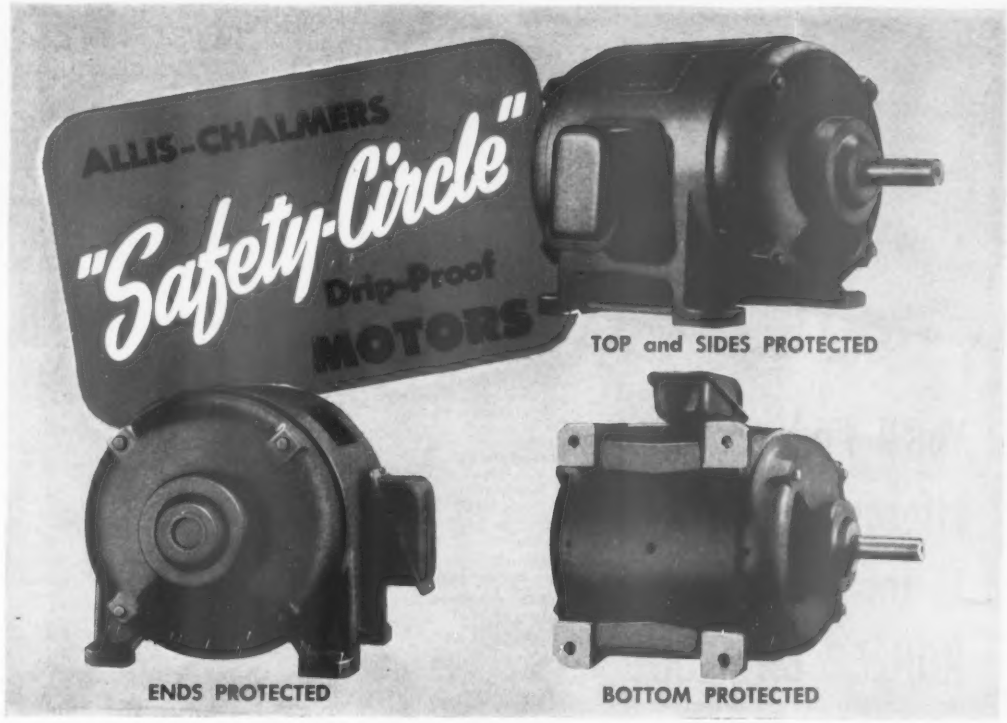
Swivel Connector for Air Tools

Air-tight swivel connectors designed for use with compressed air-operated tools provide a 360-deg. swivel action. When used at the air intake point, they are said to eliminate wrist strain and cramped hands in handling pneumatic hammers, grinders, chippers, spray guns, and other portable air-powered tools. Fabricated of rust-resistant steel, they may be obtained in straight or ell types to fit hoses from ¼ to 1 inch and pipe from ⅛ to 1 inch in size. The Cleveland Vibrator Co., 2732 Clinton Ave., Cleveland 13.

•

Work Gloves

Coated cotton work glove, called Plyglov, will not crack or peel; does not become slippery when immersed in oil, water, or solvents; and is water-, acid-, caustic-, and petroleum-solvents-proof, according to maker.



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THAT SOLID CAST IRON FRAME protects SAFETY-CIRCLE working parts against physical damage from every angle. The completely enclosed bottom provides extra protection and extra strength. End brackets are drip-proof at no premium.

Because the frame is cast iron, it is resistant to rust and corrosion. It withstands physical abuse and will not distort.

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Don't be satisfied with a motor that gives you less than full protection. Insist on the extra protection of SAFETY-CIRCLE.

For complete details on SAFETY-CIRCLE advantages, see your A-C Authorized Dealer, Sales Office, or write for Bulletin 51B6210B. Sizes from 1 to 20 hp, 326 frames and smaller. Safety-Circle, Texrope and Vari-Pitch are Allis-Chalmers trademarks.

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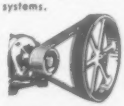

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- AIR VALVES
- NEEDLE VALVES
- ENGINE PRIMER PUMPS
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PLUMBING FIXTURES • HEATING EQUIPMENT • ELECTRIC PLANTS

Gloves are available in four different styles to meet various working conditions. The Milburn Co., 3246 E. Woodbridge St., Detroit 7.

•

Circuit-Breaker Panelboard

Small panelboard, called Pushmatic, makes or breaks circuits with a push of the finger. If power is broken by a short or overload, service may be restored with the same pushing operation. Manufacturer states that it contains ample wiring space, and is available in 2-, 4-, and 8-unit cabinets. BullDog Electric Products Co., Box 177, Roosevelt Park Annex, Detroit 32.

•

Welder's Goggle

Compression-molded of phenolic compound, welder's goggle features an indirect ventilated louver side shield. Individually molded nonreflecting eyecups have rounded face-contacting edges. Other features include wide-angle vision, chain nose-bridge enclosed in plastic covered tube, large lens rings, and one-piece rubber headband. Fitted with 50-mm. round Noviweld lenses in shades 3, 4, 5, 6, or 8, as well as with Noviweld Didymium lenses in shades 3, 4, 5, or 6. American Optical Co., Southbridge, Mass.

•

Paving Breaker

Heavy-duty paving breaker, the 52AJ Air-Jac, weighs 80 pounds, has an integral air lift cylinder that utilizes line air pressure to lift the tool and pull stuck steels. This cylinder has a leg parallel to the break-

BAD AIR IS COSTLY...

... as compared to the blower that keeps air fresh

Your men can't produce at top efficiency when stagnant, hot or fume-filled air robs them of their energy.

Wherever bad air slows down production . . . in shipholds, tanks, drums, boilers or other places where men need fresh, cool air . . . a Coppus Blower becomes both a safety device and a production tool.

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Six frame sizes—
1 to 150 horsepower

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Six frame sizes—
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Battery-powered industrial truck charging smelting furnace. Wire screen protects operator.

Charge fiery brass smelting furnace . . .

Cut 2 hours from smelting cycle . . .

Save hot, fatiguing labor of 5 men.

An electric industrial truck is used as a furnace charger at the W. J. Bullock smelting and refining plant in Fairfield, Alabama. Flames leap out furnace door making a battery-powered truck mandatory. A ten-foot long ram-attachment inserts ton loads of scrap into furnace . . . a rotating head spills load directly into furnace. Labor of 5 men is saved, releasing them for other work. 2 hours cut from smelting cycle. Heat loss during loading greatly reduced.

A fleet of sturdy battery-powered trucks speeds all handling in the Bullock plant. Trucks work 24 hours a day, seven days a week with practically no down time. Move bales, drums, slabs, pigs, ingots into or out of boxcars, production and storage. Provide fireproof motive power with utmost dependability for round-the-clock handling throughout all operations.

Another example of electric truck safety and sturdiness helping industry—while providing material handling *at lowest cost per unit moved.* This criterion, rather than initial investment, explains why so many industries prefer battery-powered trucks!

THE ELECTRIC INDUSTRIAL TRUCK ASSOCIATION
3701-F North Broad Street, Philadelphia 40, Pa.

er through which a lifting force of 100 pounds is exerted, relieving the operator of heavy lifting. Le Roi Co., 1706 S. 68th St., Milwaukee.

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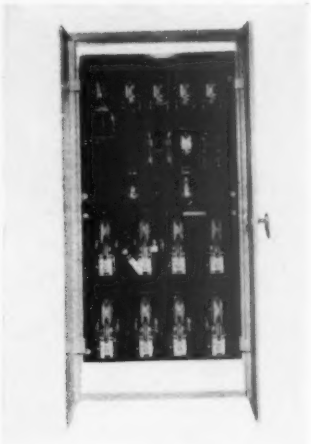

D.C. Crane Hoist Control

Intended for use on whirley, revolver, gantry, and overhead cranes in steel mills, warehouses, on ore bridges, and on loading towers, d.c. crane hoist control is said to provide power hoisting and dynamic lowering. Change from hoisting to lowering is inherent in the control, independent of the operator or any particular control device, according to manufacturer. When decelerating, speed is automatically reduced before solenoid brake sets, minimizing mechanical brake maintenance and protecting both motors and hoist equipment from wear and shock. Spring-closed contactor which provides the braking circuit retards the lowering speed even if magnet brake should fail to hold an excessively heavy load. General Electric Co., Control Divs., Schenectady 5, N. Y.

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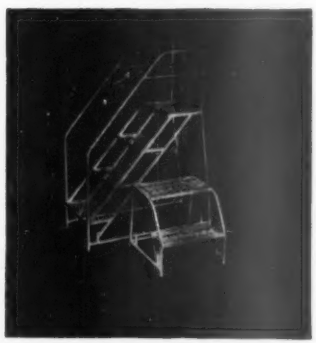
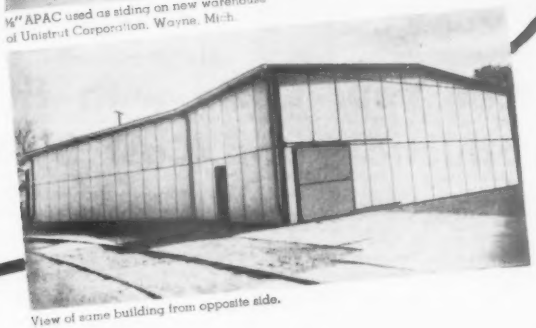


Mobile Stepladder

Ball bearing casters permit stepladder to be moved wherever needed, and rubber-tipped legs drop to the floor automatically whenever anyone

OUTSIDE AND INSIDE, TOO... IT'S K&M "Century" APAC

½" APAC used as siding on new warehouse of Unistrut Corporation, Wayne, Mich.



View of same building from opposite side.

In this new building of the Unistrut Corporation, Wayne, Mich., "Century" APAC asbestos-cement sheets were used both for siding and interior walls . . . where they can be counted on for a long life-time of dependable service.

"Century" APAC is the ideal material for industrial buildings of many kinds . . . both in new construction and remodeling. It is economical to use . . . easy to handle and apply, so goes up fast. It requires no protective paint, and maintenance is at a minimum. In fact, APAC actually grows tougher with age.

In addition to its use as siding and interior walls, APAC is extensively used for ceilings, office paneling, partitions, sheathing in machine shops and stock rooms, elevator shaft casings, storage bins and other flat surface applications.

Being made of asbestos and cement, APAC is fire resistant and proof against weather, rust, corrosion, rot, rodents and termites. It can be applied over insulation board, wood studs, solid wood sheathing, steel or wood girts. APAC is furnished in thicknesses of 3/16", 1/4" and 3/8". Standard size sheet is 4' x 8', but cutting to size is simple—just score and snap off.

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Cut *Your* Costs with this Production and Cost System

Sunbeam Corporation, Chicago, simplified control of production, costs and payroll through McCaskey "Visible-Filing and One-Writing" in 1921; has extended control several times with increase in facilities for manufacturing the "Shavemaster" and other Sunbeam electrical products.

McCaskey provides their central production office with visible control over all the work-in-process by piece part numbers and operations with a minimum of clerical overhead, according to Mr. John J. Kaser, Sunbeam Production Manager. Thousands of posting operations are saved, for example, by quickly filing copies of control tickets on McCaskey Planning Boards for this control.

The visualized tickets provide a progress record by operations (frequently as many as forty) that is available at a glance, as shown in the illustration above. They also constitute a complete record of work-in-process that is both accurate and up-to-date. Errors and delays seldom occur since the tickets are identical copies of certified original records.

Additional copies, made without additional writing, promptly provide the Payroll Department with data for computing incentive and non-productive earnings, the Cost Department with identical information for analyzing actual performance in comparison with standards, and Employees with a "receipt for pieces made" and a later verified record of earnings.

This one multi-copy ticket thus provides the data for complete production records and control and makes them available with a saving of thousands of hours of clerical work annually. Continued use of the McCaskey fundamentals of "One-Writing and Visible-Filing" for twenty-eight years indicates the flexibility of McCaskey Controls and their adaptability to rapidly expanding and changing requirements.

Write for a demonstration and suggestions for an application to your particular needs.

THE McCASKEY REGISTER CO.
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Kindly send me a copy of "The ABC's of Production Control" and other descriptive folders.

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Position .....

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INDUSTRIAL CONTROLS
PRODUCTION • INVENTORY • TOOLS • COSTS • PAYROLL

steps on the ladder. Made with from one to six steps from aluminum-finished steel. Nonslip reinforced expanded steel step plates are electrically welded to the ¾-in. steel tubing frame. Handrails are optional on models having from 3 to 6 steps; removable steel mesh basket optional. The Ballymore Co., 3 S. Roberts Rd., Bryn Mawr, Pa.

•

Wash Basins

Enameled iron wash basin 4 feet in diameter, 8 inches deep, called Flambeau, has separate faucet and spraying facilities for 8 persons; temperature control mixing valve. Either overhead or floor connection. All fittings are chromium-plated cast brass, sink surfaces are acid-resisting enamel. Kohler Co., Kohler, Wis.

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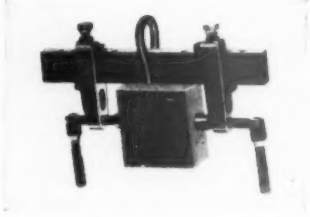


Lifter

To facilitate handling bulky and awkward materials, nonslipping hoist, called the Gonser Grizzly Lifter, is said to eliminate the use of chains, ropes, slings, pinch bars, or C-clamps. Lifter bar, calibrated in inches and available in various lengths, is said to deflect apportionately when any material is lifted, creating a gripping action. Jaws remain locked until lifting pressure is released. Swivel-joint locking handles require no tools for tightening. Reversible jaws permit either inside or outside clamping; may be used as a jack, jig, or fixture. For protecting surfaces, gripper cups (metal disks with rubber facing) may be fitted to the jaws. Pucel Enterprises, Inc., 3746 Kelley Ave., Cleveland 14.

•

Expendable Wood Pallets

Expendable 4-way wood pallets are custom-made to fit specific shipping and materials handling needs. Manu-

THIS PAGE FOR IMAGINEERS

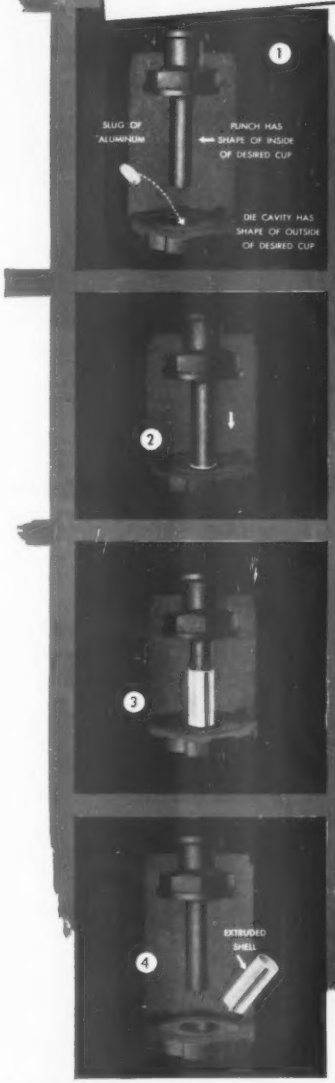
ALCOA'S IMPACT EXTRUSION PROCESS OFFERS CHALLENGE TO

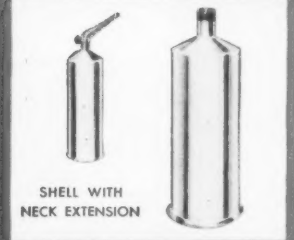
Improve your product, cut your costs!

In a fraction of a second, a slug of aluminum becomes a semifinished part, in the Alcoa Impact Extrusion Presses. Here, formed in one swift stroke, can be a housing, or shell, or body, or cylinder; strong, stiff, ready for final assembly operations. A part with sides and bottom integral; as large as 5″ in diameter, 16″ long!

Eliminate expensive, time-consuming operations. Shapes that formerly required assembly of two or more parts are produced at high-production rates. Bosses, lugs, stems, and necks may be formed integrally with the shape, in the same operation.

In one stroke, an Alcoa Impact Extrusion can revolutionize production and assembly of your product; can add beauty of line and form that boost sales. A quick glance at the possibilities shown here should prompt you to write for the new booklet "Alcoa Aluminum Impact Extrusions", or phone your nearest Alcoa sales office. ALUMINUM COMPANY OF AMERICA, 2126H Gulf Building, Pittsburgh 19, Pennsylvania.





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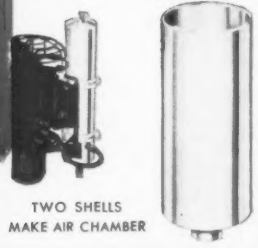

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facturer states that they are sufficiently inexpensive to permit their being discarded after initial use. Acme Pallet Co., Inc., 15 Park Row, New York 7.

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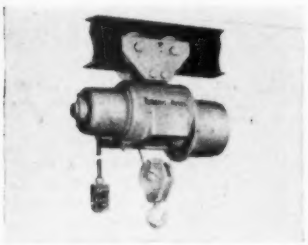

Wire-Rope Hoist

Suitable for stationary, hook, or trolley mounting, Type J wire-rope hoist is available in ¼-, ½-, and 1-ton capacities with pendent rope or pushbutton control. All models are equipped with totally enclosed ball-bearing motors said to develop high starting torques. Electrically activated shoe-type motor brake provides instantaneous stopping, is said to permit accurate spotting of loads. Manufacturer states that safety-enclosed hook blocks and drop-forged steel hook swivels prevent uneven or jerky lifting by eliminating twisted and jammed cables. Trolley assemblies, adjustable for various beam sizes, have ball-bearing wheels. Robbins & Myers, Inc., Springfield, O.

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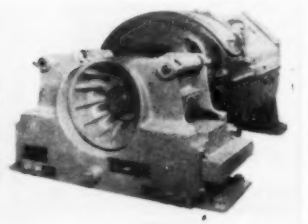

Magnetic Brake

Designed for use on steel mill drives, cranes, hoists, bridges, and conveyors, d.c. 2-shoe, 2-magnet brake consists of a malleable iron frame, 2 self-aligning shoes which pivot on spherical bearings, 2 armatures which pivot on sealed graphite bearings, 2 E-type magnets with cast-in coils, and a ventilated wheel of molybdenum alloy. Equipped with torque-setting indicator which shows ft.-lb. torque setting, and a clearly marked operating gap indicator to provide visual check on magnet gap and lining wear. Applicable for either right- or left-hand mounting, on the floor or, with brackets, on motors. General Electric Co., Control Divs., Schenectady 5, N. Y.

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Corrugated Conveyor Belt

Conveyor belt, called Ruff-Ridge, is molded with a corrugated surface

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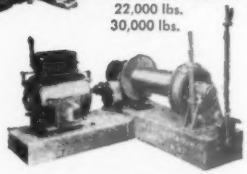

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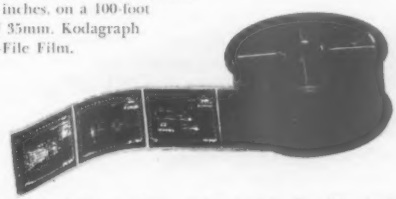

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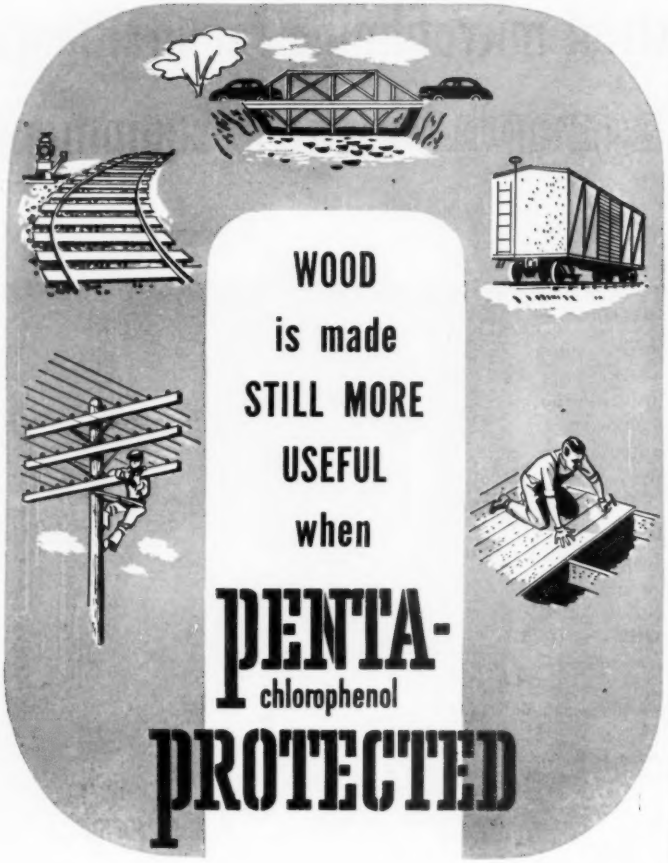

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said to raise light goods in cartons or heavy materials in bags up inclines of 30 to 40 degrees. Solid woven carcass is impregnated with a neoprene solvent cement for moisture resistance. Upper side is coated with a layer of neoprene-natural rubber molded into corrugations. Belt as available in several thicknesses, standard widths up to 24 inches; 250-ft. rolls. The Russell Mfg. Co., Middletown, Conn.

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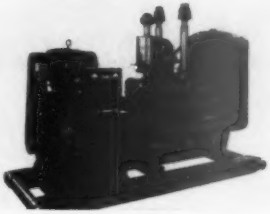

Power Plant

Packaged electric power plant, featuring an 8-cylinder, 4-cycle H-540 Le Roi engine operating on gas, butane, or gasoline, is designed for maximum horsepower at minimum weight, according to maker. Directly connected to generator; continuous duty rating is 30 to 50 kw., with intermitted duty rating up to 75 kw. A piston travel of 900 fpm. is maintained at 1200 rpm., 1275 fpm. at 1800 rpm. Unit is supplied either for permanent installation or on a portable skid-type steel base for emergency stand-by equipment. Carson Machine & Supply Co., 200 S. E. 29th St., Oklahoma City.

•

Pin Riveter

For use in very light riveting operations with soft-metal tubular and standard rivets, pin riveter is said to be suited to a variety of special jobs, such as setting small drive screws, driving brads, light peening and scaling on thin sheet-metal sections and bakelite. Unit weighs 13 ounces, is 6 1/16 inches long. Piston diameter, 19/32 inch, stroke, ½ inch; 9000 blows per minute. Keller Tool Co., Grand Haven, Mich.

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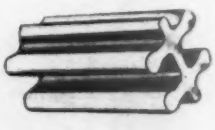

Magnesium Safety Blocks

Extruded magnesium blocks are designed for use in metal forming presses as a safeguard to operator

DROP SECTIONS...

for

DIPPING
CLEANING
PAINTING
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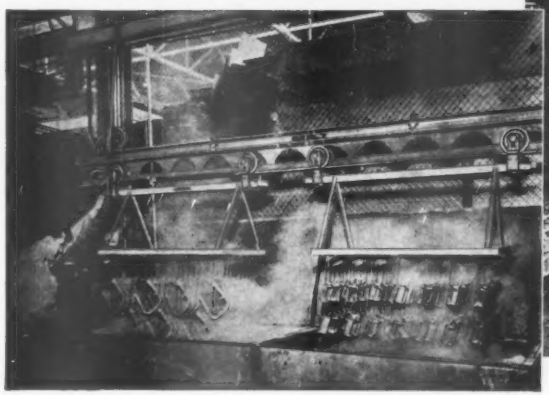

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working within press opening. Available in any required lengths, and in three sizes. Features, according to maker, include light weight, correct shapes for good press application, high unit strength, and maximum resistance to shock loads. Magline, Inc., Pinconning, Mich.

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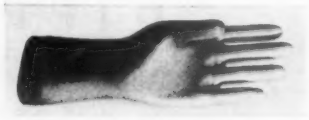

Rubber Gloves With Roughened Grip

Made with roughened fingers and palms to permit a "sandpaper" grip on slippery objects, rubber gloves are 11 inches long, made in sizes from 7½ to 11. For use in handling objects immersed in liquids, they are said to reduce damage and breakage and to speed production. The B. F. Goodrich Co., 448 S. Main St., Akron, O.

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Dry-Type Transformers

Line of dry-type transformers with two rated-kva. 5 per cent taps below rated primary voltage are developed to enable users to obtain 120/240 volts output from undervoltage supply lines. With ratings from 1-50 kva., inclusive, Type M and D transformers are designed for both 480- and 600-volt supply lines, with series-multiple secondaries. Suitable for use in lighting installations where some voltage adjustment may be necessary to maintain efficiency in light output. Specialty Transformer & Ballast Divs., General Electric Co., Schenectady 5, N. Y.

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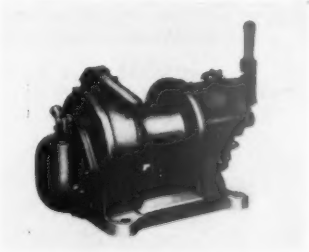

Single-Drum Air Hoist

Small single-drum utility hoist, Size BU, is suitable for lifting, skidding, and hauling jobs. Manufacturer

OHIO EDISON CO. is one of the many light and power companies throughout the nation that use OIC Valves. Pictured is the Ohio Edison Gorge Power Plant that supplies a portion of the electricity requirements of the Greater Akron area.

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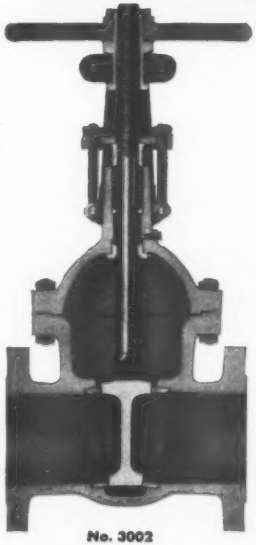
SETS THE PACE
IN VALVES



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There are no flow obstructions to cause turbulence and pressure drop in OIC Valves. OIC Valves have streamlined, straight-through ports with inner walls as smooth as glass! The heavy I-beam wedge rises entirely clear of the fluid passageway. There are no recesses or pockets between the valve body ports and the seat openings. And OIC Valves are built with rugged strength to withstand the highest pressures. OIC Valves give you extra body-wall thickness . . . precisely calculated flange and gasket dimensions . . . accurate distribution of materials to prevent concentration of stresses in any one part.

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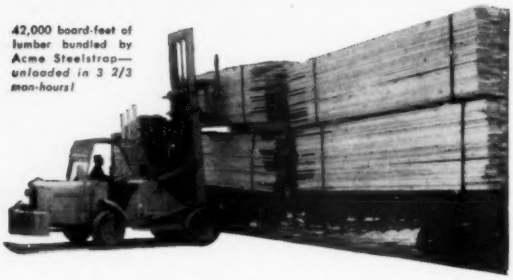

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claims it will lift a 600-lb. load 50 fpm., and that heavier loads may be handled by the use of proper sheave blocks. Reversible 4-cylinder radial piston-type air motor, equipped with safety-type throttle, supplies extra power for heavy-duty jobs. Wide band-type brake provides holding power; reversible motor permits lowering load while under power. Clutch lever provides for pulling out cable to disengage drum. Measures 18½x10¾x11¾ inches; weighs 72 pounds without rope. Ingersoll-Rand Co., 11 Broadway, New York 4.

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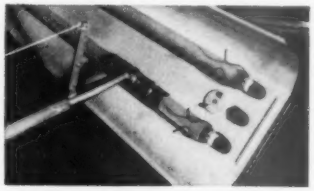

Lamp Changer

Device for removing and replacing fluorecent tubes without use of ladders has gripping jaws which open by pulling a cord. When cord is released spring automatically turns the lamp 90 degrees so it can be removed from fixture and lowered. To install a new lamp, tube is placed in holder so that pins line up with slots in socket, lamp is inserted, cord is pulled until lamp is turned through 90 degrees. Jaws then open, permitting tool to be removed. Newman Mfg. Co., Box 5905, Kansas City 2.

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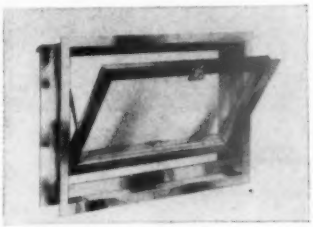

Glass Block Window Ventilator

Stainless steel ventilating windows are designed to fit 6 standard sizes of glass block openings. Resistant to corrosion, chemical and industrial fumes, and salty air; need no painting, polishing, or other maintenance. Tubular design is said to prevent glass breakage and to add strength and rigidity. Stainless steel screen frames with corrosion-resistant plastic screening also available. Modern Stainless Specialties Co., 6131 S. Wentworth Ave., Chicago 21.

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Chuck for Centerless Shafts

Adjustable collet bushing chuck supports centerless shafts concentrically in lathe. Said to make possible accurate centering of any shaft ¼ to 1 inch in diameter. No. 2 or No. 3

Because EXTRA CARE Goes Into The Windings

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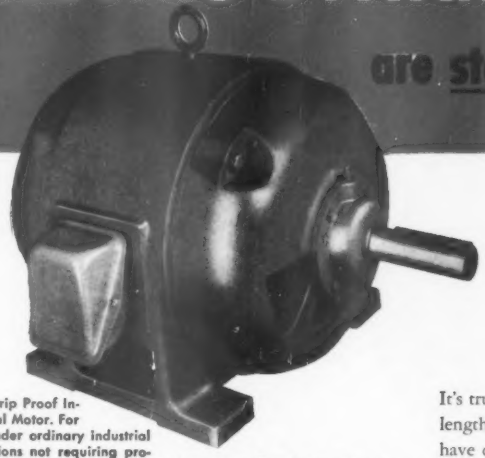

E.D. Drip Proof Industrial Motor. For use under ordinary industrial conditions not requiring protection from splashing liquids or from atmosphere laden with dirt, or metal chips.

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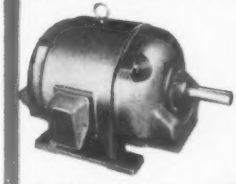
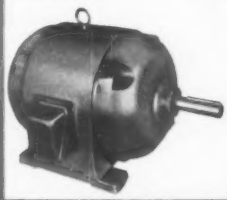


SPLASH PROOF
For installation where the motor is subjected to splashing liquid or hosing down for cleaning.

TOTALLY ENCLOSED (Fan Cooled)
For use in dirt-laden atmospheres, especially where the installation requires a motor of compact dimensions.



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For use in exceptionally dirty atmospheres, particularly when metallic dust is present.

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Over 100,000 *of Kester flux-core Solder* Types and Sizes Available

Standard for Industry Since 1899

POSITIVE FLUX UNIFORMITY

Kester Flux-Core Solders are made with a single core in several core sizes ranging from an opening that contains ½ of 1% to 7% of flux by weight. These core sizes are available in each of 66 strand sizes. Use of the correct size assures you of absolute soldering control. Consult our Technical Department on any soldering problem.

LABORATORY CONTROLLED

FREE: Kester's New Technical Manual

"SOLDER and Soldering Technique." A complete analysis of the properties and application of soft solder alloys and soldering fluxes. Get your copy now.

KESTER SOLDER COMPANY

4201 Wrightwood Avenue, Chicago 39, Illinois

Factories Also at

Newark, New Jersey • Brantford, Canada

1899 50th Anniversary 1949

KESTER SOLDER

Morse taper shanks for either headstock or tailstock. Brass collet chucks available for round stock in sizes from ¼ to 1 inch, by 16ths. Special 0.637 collet also available for automobile generator armatures. South Bend Lathe Works, 298 E. Madison St., South Bend 22, Ind.

•

Paint Spray Unit

Portable spray unit with adjustable nozzle, Spraymaster Model SM-25, sprays paints, insecticides, and mothproofing solutions. Optional accessory, consisting of hose with tire valve chuck, permits it to be used to inflate tires. Unit is a motor-driven sprayer with a twin-cylinder-type compressor driven through steel and fiber gears. Equalizer storage tank is said to maintain average spraying pressure of approximately 25 pounds. Unit weighs 7½ pounds. Portable Electric Tools, Inc., 255 W. 79th St., Chicago 20.

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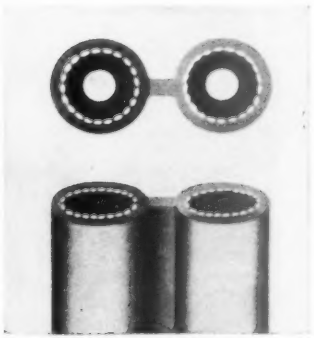


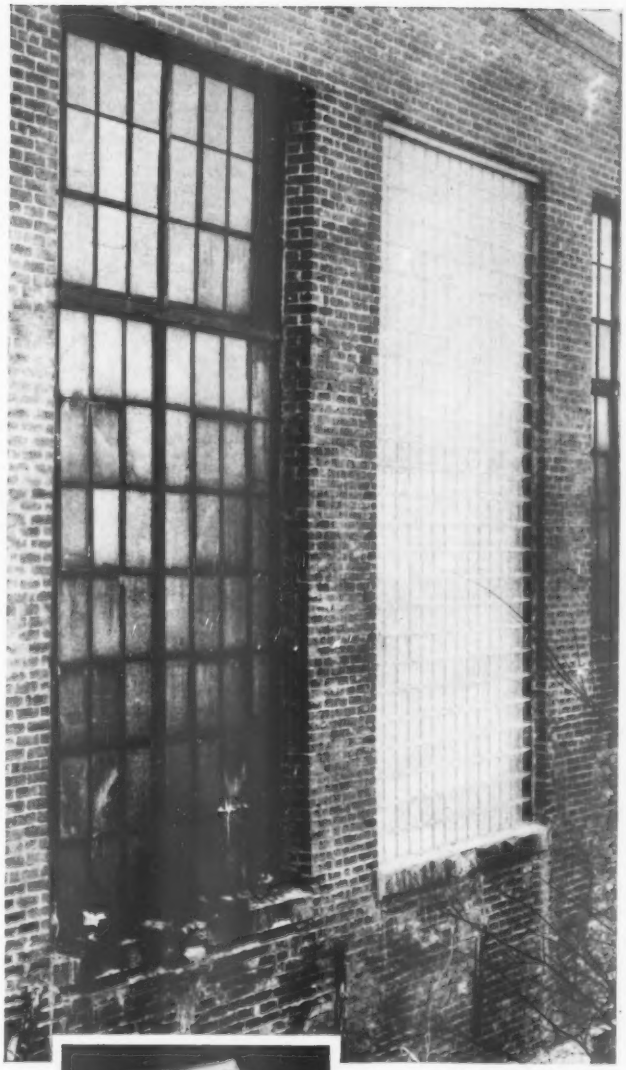
Double Hose

Twin oxyacetylene hose combines two lengths, one red, the other green, joined by a thin strip of rubber, which permits hose to be separated into single lengths when necessary without tearing into the cover of either length. Called Duo-Weld, it is made in 50-, 25-, and 12½-ft. lengths. Molded finish cover is smooth; reinforcement consists of one braid of high tensile hawser cord cotton yarn. The B. F. Goodrich Co., Akron, O.

•

Gas Detector and Controller

For use where combustible gas accumulations cause a fire or explosive



Why it's wise to modernize with Insulux

SO MANY advantages are yours when you modernize with Insulux Glass Block, you can't afford to overlook the facts.

Here are a few:

1. **Insulux reduces maintenance costs—does not need painting, is easy to keep clean, and does not rot, rust or corrode.**
2. **Insulux Glass Block has high insulation value—this means more uniform temperature control, less condensation during cold weather, lower fuel bills.**
3. **Insulux transmits and distributes daylight to plant interiors.**
4. **Insulux reduces infiltration to a minimum, helps keep plant air dust-free and eases the job of humidity control.**

Get the complete story about Insulux Glass Block, the remarkable building material that does things other materials will not do. Consult your Insulux dealer, or send the coupon below for free booklet. It gives full information on many successful Insulux applications, and is profusely illustrated.

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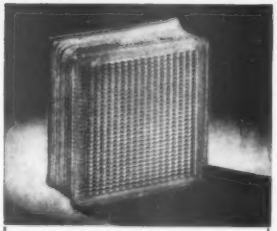


INSULUX

GLASS BLOCK ®

AMERICAN STRUCTURAL PRODUCTS COMPANY

Subsidiary of
OWENS-ILLINOIS GLASS COMPANY

▲ **Completed** and uncompleted panels from a paper mill recently modernized. Insulux Glass Block will reduce maintenance costs, freely transmit daylight to plant interior and increase plant efficiency.

MAIL NOW

AMERICAN STRUCTURAL PRODUCTS COMPANY
Dept. F-29, P.O. Box 1035
Toledo 1, Ohio

Please send free 36-page, fully illustrated booklet, "Daylight in Industrial Buildings."

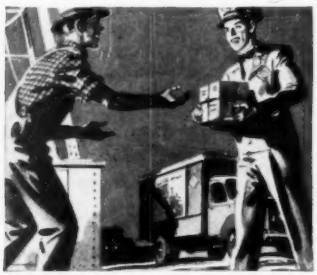
*Name*_____

*Address*_____

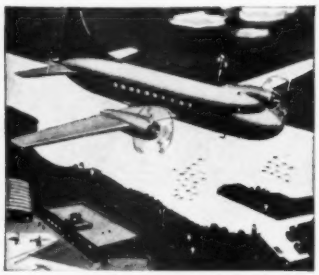
*City*_____ *County*_____ *State*_____

$3.19 Air Express cost helped this wildcatter strike it rich!

When a pump valve goes while drilling for oil, it's costly. Idle men and equipment make profits evaporate. It happened to a wildcatter at 4 P.M. Phoned 800 miles away for parts—delivered 11 P.M. that night by Air Express. 12 lbs. cost only $3.19. (*Regular* use of Air Express keeps *any* business moving.)



$3.19 was *complete* cost. Air Express charges include speedy pick-up and delivery service. Receipt for shipment, too. Makes the *world's fastest* shipping service exceptionally convenient.



Air Express goes on all Scheduled Airline flights. Frequent schedules—coast-to-coast overnight deliveries. Direct by air to 1300 cities, fastest air-rail to 22,000 off-airline offices.

Facts on low Air Express rates

Special dies (28 lbs.) go 500 miles for $4.30.
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(*Same day* delivery if you ship early.)

Only Air Express gives you all these advantages: Special pick-up and delivery at no extra cost. You get a receipt for every shipment and delivery is proved by signature of consignee. One-carrier responsibility. Assured protection, too—valuation coverage up to $50 without extra charge. Practically no limitation on size or weight. For fast shipping action, phone Air Express Division, Railway Express Agency. And specify "Air Express delivery" on orders.

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Rates include pick-up and delivery door to door in all principal towns and cities

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hazard, gas detector and safety controller continuously samples and analyzes plant atmosphere. When gas accumulation approaches danger point, automatic alarm, both audible and visible, is set off, and the device activates plant's fire-fighting system, ventilation system, or both. Gas analysis cells placed at danger points throughout plant instantaneously record readings of gas concentrations on wide-faced meter of central control panel. Separate signaling system indicates both visibly and audibly any failure of the instrument. Lor-Ann Instrument Co., Inc., 58 Montgomery St., Jersey City, N. J.

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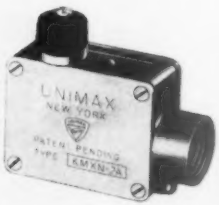

Metal-Enclosed Switch

Neoprene boot sealed to actuating plunger of Unimax Model KMXN-2A switch is said to prevent entrance of moisture or dust to plunger mechanism. Sealed actuator assembly is integral with die-cast case, called Adapta-case, which has removable side plates, neoprene side gaskets, and threaded mounting studs. Basic switch slips onto positioning studs, permitting the switch to be withdrawn from case for connection of wiring after the housing is fixed in position. For either upright or inverted mounting normal to a panel or chassis, case can be supplied with reversible, flanged side plates. Unimax Switch Div., W. L. Maxson Corp., 460 W. 34th St., New York 1.

•

Dip Tank, Melting Pot

Known as Electrodip, insulated dip tank or melting pot is thermostatically controlled, has a thick-walled aluminum casting dip compartment 6 inches deep, and tapered from top, 7x7 inches, to bottom, 5x5. Over-all size, 12x12x10 inches. May be used for dipping ethylcellulose and other removable plastic coatings on parts, tools, and dies. As an oil bath may be used to transfer heat at controlled temperatures to irregularly shaped parts. Closed-type heating elements

You will be amazed at the performance

of the REDESIGNED *Cleveland* END MILLS

STRONGER! CUT FASTER! CLEAR CHIPS BETTER!

Much Greater Durability and Accuracy!

The new *Cleveland* End Mills are far superior to any you have ever used! They have been completely redesigned to give you strength, speed and accuracy that were never before obtainable! Many months ago we set out to design a different and better end mill. Neither time nor effort was spared in patient development work. We even worked out a new technique for testing the cutting qualities and the stamina of end mills. Users are enthusiastic about the results: Less breakage, many more cuts per grind, consistent accuracy . . . with up to *50% increase in feed.* For high speed, low cost operation, use the new *Cleveland* End Mills on your next job. Contact our Stockroom nearest you, or . .

Telephone your Industrial Supply Distributor

STRONGER
No sharp corners or points where localization of stresses might occur. Minimum amount of metal has been cut away.

MORE DURABLE
New-style clearance supports the cutting edge, assures against "flaking" or "chipping out."

LONGER LIFE
Radically new flute shape and chip clearing ability reduce wear on the cutting edge, thus maintaining consistent accuracy.

CUT FASTER
New flute shape gives maximum cutting qualities at increased rates of feed.

CLEAR CHIPS BETTER
Redesigned flutes are machine polished. There are no pockets. Chips are free to move.

GREATER ACCURACY
New clearance and accurate machine polish of flutes result in closer control of size.

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1242 East 49th Street • Cleveland 14, Ohio
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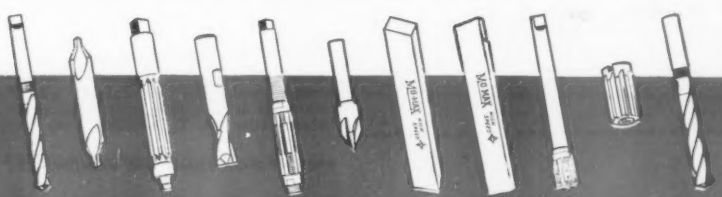
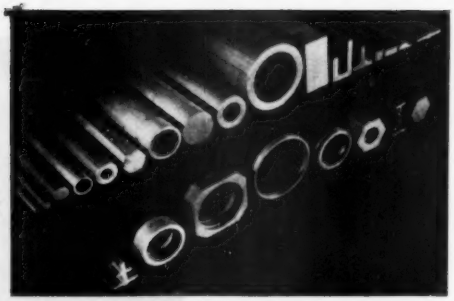
ASK YOUR INDUSTRIAL SUPPLY DISTRIBUTOR FOR THESE AND OTHER *Cleveland* TOOLS

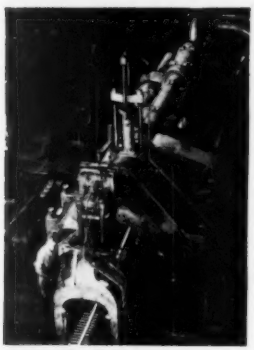




Typical Ampco extrusions. Solid rounds and hex available from stock.

Ampco Metal sheet and plate, 3/16" to 1 1/4" thick, available from stock.

SAVE
THROUGH LONGER SERVICE LIFE
...with AMPCO MILL PRODUCTS
Extruded Rod and Tube — Sheet and Plate



The 2275-ton hydraulic extrusion press in the Ampco Mill.

You can give your customers a better, longer-lasting product by using Ampco aluminum bronze. Its "built-in" wear and corrosion resistance are available in various grades to meet your specific needs for hardness, tensile strength, bearing qualities, etc.

By the same token you can rebuild or repair your own machinery and equipment for longer service — and you can reduce maintenance costs by using these durable, wear-resistant alloys.

Take full advantage of Ampco's extensive mill facilities and laboratory-controlled quality. Ask your nearby Ampco Field Engineer for complete details on Ampco's mill products and mill production facilities.

AMPCO

Complete details . . . no obligation!

AMPCO METAL, INC., Milwaukee 4, Wis.
West of the Rockies it's the Ampco Burbank Plant, Burbank, Calif.

Tear out this coupon and mail today!

AMPCO METAL, INC., Dept. FM-8, Milwaukee 4, Wisconsin
Send me complete information on Ampco mill products and production facilities.
Name ..... Position .....
Company .....
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City ..... (.....) State .....
M-1

of 1000 watts and thermostat ranges from 60 to 250 degrees or 200 to 500 degrees F. are available for either 115 or 230 volts. The H. McNaughton Co., 201 Parsons St., Kalamazoo, Mich.

•

Adjustable Chair

Suitable for machine, work bench, or drafting room, chair, Deluxe No. 664, has a replaceable snap-on seat crown, cluster leg design to permit free foot and leg movement, and adjustable seat and back. Seat taper is said to automatically position the body to give full backrest support. Handwheels control adjustments. Three heights available: 17 to 23, 21 to 27, and 26 to 32 inches. Royal Metal Mfg. Co., 175 N. Michigan Ave., Chicago 1.

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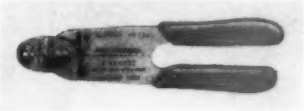


Wire Cutter, Stripper

Hand tool, called Hytool No. Y9M, cuts wire, strips insulation, and indents manufacturer's connectors on wires Nos. 22 through 10. Long one-piece molded plastic handles are said to minimize indenting force required to close insulation grips. Clearly indicated die grooves are said to facilitate installation of the connectors. Burndy Engineering Co., Inc., 107 Bruckner Blvd., New York 54.

•

Alarm Silencer

To eliminate the danger of leaving open manually operated knife switches in alarm circuits, Autocon alarm silencer, Type ABS, may be

Blast furnace No. 3, The Shenango Furnace Company, Sharpsville, Pa.

● Corrosive conditions are extremely severe in the vicinity of blast furnaces. Carbon monoxide, sulfur dioxide, hydrogen sulfide, water, steam, intermittent high heat and cooling, and general blast furnace corrosives combine to attack surrounding structures.

The Shenango Furnace Company, Sharpsville, Pa. found that ordinary protection was inadequate under such conditions. For long-lasting corrosion prevention, two coats of Koppers Bitumastic® Super-Service Black were applied to two blast furnaces, as well as surrounding stoves, piping, walkways, railings and other structural work.

Today, after more than a year of service, the tough, thick barrier of this Koppers Coating is keeping corrosion completely at bay. It will keep maintenance costs low for years to come.

No matter how severe conditions may be around your plant, one of the specially-formulated Koppers Bitumastic Protective Coatings will guard your structures against corrosion due to atmospheric conditions, chemical fumes, moisture and heat.

FOR COMPLETE INFORMATION
on Koppers
Bitumastic Protective Coatings

Koppers Company, Inc.
Dept. 801T
Pittsburgh 19, Pa.

Gentlemen:

Please send me your free 16-page booklet, "Stop Corrosion."

Name.....

Company.....

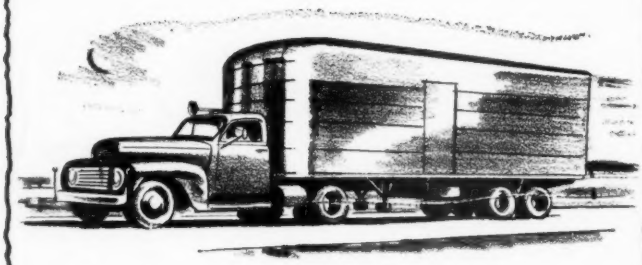
Position.....

Address.....

KOPPERS COMPANY, INC., Dept. 801-T, Pittsburgh 19, Pa.

KOPPERS **BITUMASTIC** REG. U. S. PAT. OFF. **PROTECTIVE COATINGS**

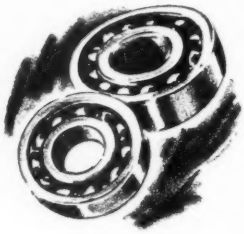
Sold through Industrial Distributors

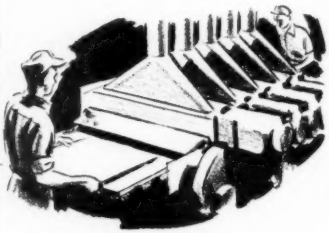


Roll up sanding savings ...with JEWEL ABRASIVES!

MANY MODERN TRUCK TRAILERS ARE MADE OF GLEAMING STAINLESS STEEL, POLISHED WITH JEWEL SILICON CARBIDE PAPER BELTS. THESE LONG-LASTING, HEAT-RESISTING JEWEL ABRASIVE BELTS CAN CUT POLISHING COSTS FOR YOU, TOO!

JEWELOX CLOTH HELPS TO KEEP INDUSTRY ROLLING. IT IS USED FOR HAND-POLISHING RACEWAYS AND SIDES OF BALL BEARING ASSEMBLIES, WHICH MUST BE MIRROR-SMOOTH.





800% BOOSTS IN DRUM SANDER PRODUCTION HAVE BEEN MADE WITH LONGER-LASTING BONDEX GARNET FIBRE. THIS OUTSTANDING WOODWORKING ABRASIVE IS ONLY ONE OF THE MANY NEW DEVELOPMENTS PIONEERED BY AP ENGINEERS.

ORDER JEWEL COATED ABRASIVES FROM YOUR DISTRIBUTOR, OR WRITE US IF YOU HAVE A SPECIAL SANDING PROBLEM.

Abrasive Products, Inc.

SOUTH BRAINTREE 85, MASSACHUSETTS · MAKERS OF JEWEL COATED ABRASIVES

used with any type electrical alarm circuit that indicates emergency conditions, such as pressure, liquid level, temperature, smoke, or gas overload. Provides continuous protection even though warning sound is stopped, according to maker. When alarm is stopped, glowing red light remains on until the trouble is corrected. When the circuit is clear, the silencer automatically resets itself and the light goes out. Automatic Control Co., 1005 University Ave., St. Paul, Minn.

•

Portable Pallet Crane

Designated No. 40 PC, portable pallet crane is intended for handling shipping cases and barrels and stacking dies, motors, or other heavy items, up to 500 lbs. weight. Made of heavy steel plate, measures 16x24 inches. Adjustable from floor level to 5 feet 6 inches; may be stopped at any height. Standard models equipped with hand hydraulic lift; motorized hydraulic lift available. Hand brake prevents crane rolling while in use. Cranes with capacity up to 6000 pounds also available. Grand Specialties Co., 3135 W. Grand Ave., Chicago 22.

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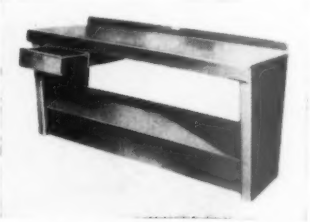


Steel Workbench

Made with a 12-gage steel top for heavy use, workbench is 6 feet long, 28 inches deep, 34 inches high. Legs slope back to give foot room. Electrical knockouts for double outlets are provided in front of each leg. Back rails keep items from rolling

. . . and here's the

CLARK VARI-TIME CORE

which provides the built-in property of delaying for a definite adjustable time, the closing of the contacts in standard D.C. contactors.

Clark Bulletin 7400
Vari-Time Contactor

This timing element or core needs no maintenance nor repairs.

For over 20 years the VARI-TIME principle has been the heart of CLARK D.C. CONTROL, in thousands of heavy duty applications. These installations have been so successfully "trouble-free", that the following guarantee is effective: "THE CLARK CONTROLLER COMPANY will replace *free of charge* any VARI-TIME CORE which will fail in service during the life of the controller."

CLARK VARI-TIME CONTACTORS eliminate all accelerating relays, resulting in wiring simplicity and a minimum of maintenance.

Complete explanation of the VARI-TIME principle and operation is found in Bulletin 7400.

Copies are yours for the asking

ENGINEERED ELECTRICAL CONTROL

THE CLARK CONTROLLER CO.

1146 EAST 152ND STREET, CLEVELAND 10, OHIO

When good eye protection . . .

is no good at all!

This is a common sight in many plants—a condition that contributes to top-heavy accident rates, compensation costs and to lags in production.

Cover-All* Goggle Style CC60

Wearing comfort, more than anything else, will move safety goggles off the forehead on to the eyes. In Cover-All* goggles, as in all WILLSON protective equipment, comfort plays a big part in their design. The large, deep eyecups allow plenty of room for wearing prescription spectacles—and they are molded with rolled edges to fit facial contours around the eyes. The soft, leather bridge adjusts to the correct distance between the eyes and the adjustable headband provides for proper head size.

Don't fail to consider personal comfort if you want eye safety equipment worn as intended.

WILLSON
"Established 1870"

DAILY REMINDERS

Such as Willson "Blind Man" safety posters keep workers in hundreds of plants aware of the need for personal safety measures. Supplies are available on request

*Reg. U.S. Pat. Off.

WILLSON PRODUCTS, INC., 219 WASHINGTON STREET, READING, PA.

off; the drawer is "pilfer-proof" and mounted on rollers. Full base to floor keeps dirt and refuse from accumulating underneath. Can be bolted to floor. Equipto, Div. of Aurora Equipment Co., Aurora, Ill.

•

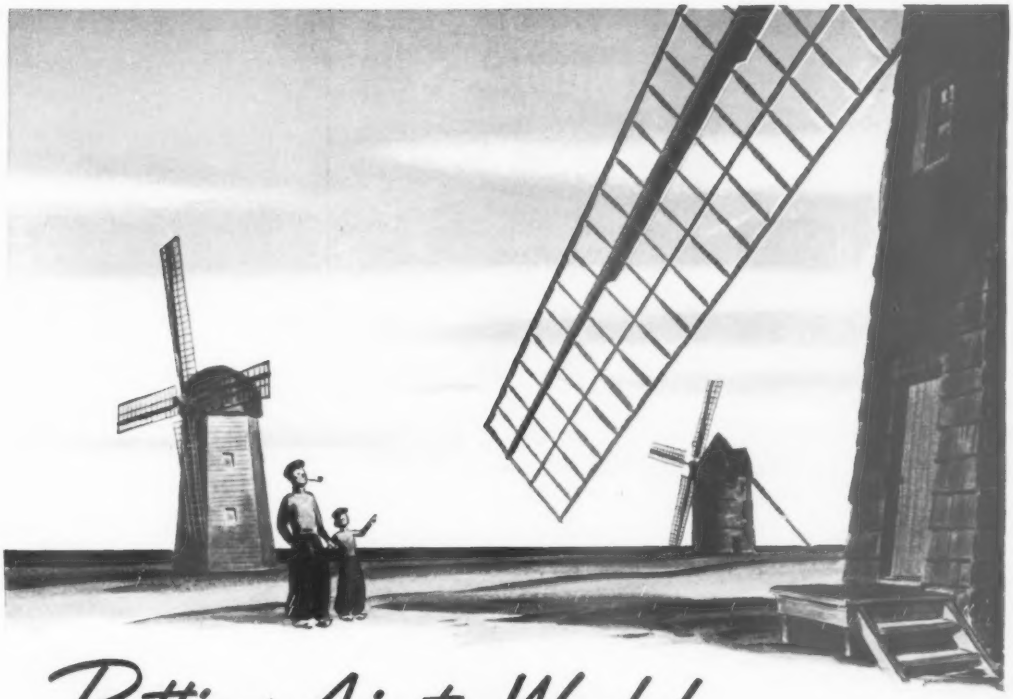
Lamp Annunciators

Line of lamp annunciators, called Super-Vize, is intended for use where such factors as temperature or pressure are controlled by equipment with normally closed or normally open contacts. Each section or "drop" is 3¾ inches wide and 1½ inches high, with a 2x1-in. space for engraved message. Two bulbs behind the engraved area illuminate the translucent Lamicoid faceplate. Unit is said to perform any service that can be effected with a 3-pole double-throw contact arrangement on relay contacts, and with a double-throw, double-pole toggle switch. The H. R. Kirkland Co., Morristown, N. J.

•

Pipe Threader

Portable machine for cutting, reaming, and threading pipes to 2-in. diameter and threading solid rounds to 1½-in. diameter will handle new work as well as maintenance. Roto-Lok wrenchless chuck serves as a quick-acting rotary vise to grip and release work. Holds galvanized or glazed pipes, polished rounds, and similar difficult-to-handle work; either right- or left-hand rotation. Interchangeable monotype die heads are free-floating to permit immediate and correct chaser contact. Single chasers are replaceable



Putting Air to Work!

This recent DeVilbiss installation in a modern stove plant increased production three times. Porcelain enamel ground coat is applied to about 75% of all parts which were previously japanned and about 90% of white parts are now being produced in one coat.

Wind was first used as a source of power many centuries ago. It was harnessed to drive windmills in Persia as early as 915 (A.D.) and is still used by the Dutch to power the windmills that prevent flooding of the low countries.

Since 1888 The DeVilbiss Company has also specialized in putting air to productive work. Spray guns and complete spray systems designed and built by DeVilbiss apply the beautiful, durable finishes that increase the salability of today's best selling brands. But, that's only part of the story. In industry after industry DeVilbiss spray equipment is helping to save costly manhours... minimize rejections due to faulty finishes . . . maintain peak production . . . and reduce mounting costs.

If you are wrestling with high costs in your finishing department, consult a DeVilbiss engineer. He will show you many money saving advantages so characteristic of DeVilbiss spray systems.

THE DEVILBISS COMPANY • Toledo 1, Ohio

Canadian Plant: WINDSOR, ONTARIO

DE VILBISS *means* **Quality** *in all four . .*

DV

SPRAY EQUIPMENT
EXHAUST SYSTEMS
AIR COMPRESSORS
HOSE & CONNECTIONS

NEW DRUM TRUCK!

AMERICAN ALL-STEEL DRUM KING

Easy One-Man Loading! The new *American* Drum King Truck makes drum and barrel loading and hauling an easy, safe, one-man operation. Drums can be loaded quickly and maneuvered with ease and complete safety. Use this new *American* Drum King to speed hauling and reduce operating costs. All-Steel construction keeps the truck on the job . . . keeps maintenance costs down.

ONLY DRUM KING HAS ALL THESE FEATURES!

1 GREATER SAFETY — **Drum King Stands Upright!**

Unique "floating axle" design permits the truck to stand in a safe, space-saving upright position *when not in use*. This feature eliminates the hazardous condition of drum trucks lying on the floor.

2 EASY TO LOAD — **Roll Drum King Right Up To The Job!**

No need to "jockey" or "inch" the truck into position. Wheels roll truck up to drum, fast and easily. Hook drops over chime of drum when released. As the load is broken, the nose prongs automatically slide under load and wheels automatically move into load-carrying position.

3 SAFE, FOUR-POINT LOAD SUSPENSION — **Permits Hook To Be Disengaged After Truck Is Loaded!**

Greater safety for both operator and truck is assured because, should the loaded truck strike an obstacle, the load is free to leave the truck without pulling operator and truck along with it.

4 LOADED TRUCK CAN STAND ALONE — **Semi-Upright Position Keeps Load Ready To Move!**

Hinged wheels permit the loaded truck to stand in semi-upright position.

5 TRUCK ROLLS EASILY — **Drum King Reduces Operator Fatigue--Speeds Hauling!**

Full weight of load is carried over strong pressed-steel rubber-tread wheels. Operator easily balances load — does not carry it.

Mail This Coupon Today!

Please send me your new American Hand Truck Bulletin HTB48 featuring the complete line of American Pressed-Steel Hand Trucks.

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COMPANY_____

ADDRESS_____

CITY_____ STATE_____

AMERICAN PRESSED-STEEL HAND TRUCKS

The American Pulley Company

4212 WISSAHICKON AVE. • PHILADELPHIA 29, PA.

when broken or worn. Available with stationary welded steel stands, or with heavy-duty wheels and retractable handles. Peerless Machine Co., Racine, Wis.

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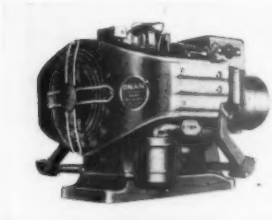


Diesel Electric Plant

Five-thousand watt a.c. diesel electric plant, Model 5DRP, features an opposed-two-cylinder, air-cooled diesel engine said to provide smooth vibration-free operation. Manufacturer claims that it runs so smoothly that it needs no bolting down, no special base. Air-cooling keeps weight down to about 725 pounds, less batteries; over-all dimensions are $38\frac{3}{4}$x$30\frac{1}{4}$x$26\frac{1}{8}$ inches. D. W. Onan &Sons, Inc., Royalston Ave., Minneapolis 5, Minn.

•

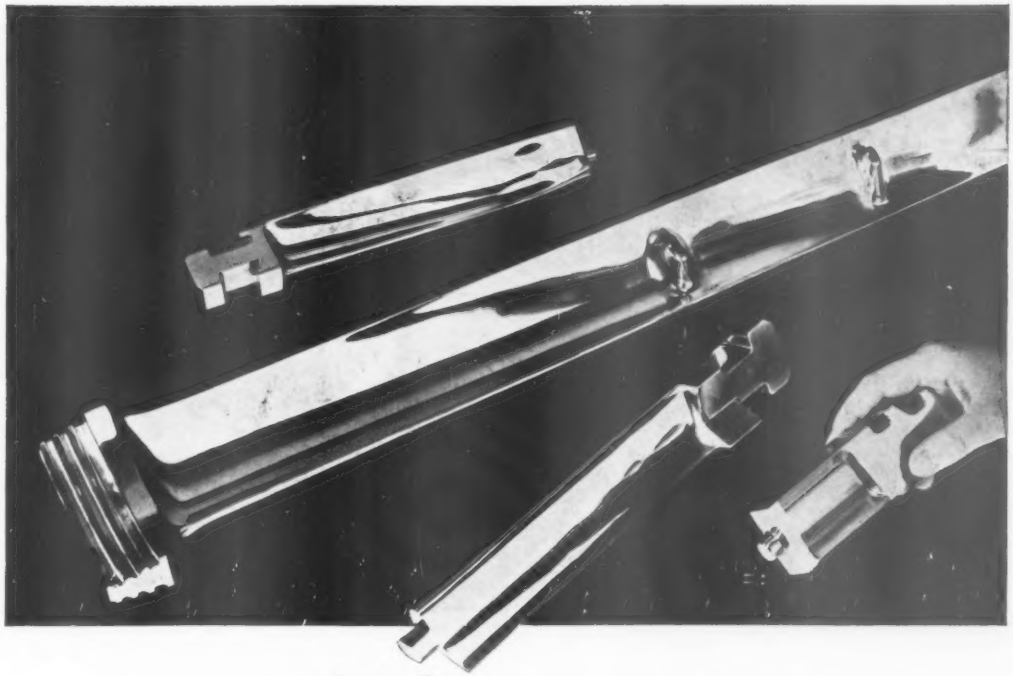
Curved Work Glove

Rubber-coated canvas glove curved to fit hand is said to permit good finger freedom. Coated with neoprene, it provides protection from acids, caustics, chemicals, and other irritants, and is resistant to greases and oils. Made in knit wrist and 12- and $14\frac{1}{2}$-in. gauntlet styles, with one-piece back; lined with flannel from finger tips to cuff ends for absorption of perspiration. The B. F. Goodrich Co., Akron, O.

•

Masonry Saws

Line of "Fireproofer" masonry saws features adjustable cutting tables, protected single-unit angle-iron frame, with all working parts of the



Where *workability* takes equal importance with Strength, Toughness, Corrosion-Resistance

High strength, toughness and corrosion-resistance make stainless steel the ideal material for steam turbine blades—but there's another quality needed, too—WORKABILITY. And you'll find it well developed in Republic ENDURO.

ENDURO responds uniformly in forging—as demonstrated by the largest blade above which was forged from a 7½" x 3" bar. All four blades indicate that a substantial amount of machining was necessary—and here again ENDURO shines, particularly in the free-machining grades.

In addition, ENDURO Cold Finished Bars—processed by Republic's Union Drawn Steel Division—provide close tolerances, accuracy of section, uniform soundness and fine surface finish that combine to hold unit costs and rejection losses to lowest possible levels.

Write us for further information on Republic ENDURO Stainless Steel Bars—both hot rolled and cold finished—also ENDURO wire.

A VALUABLE AID FOR MACHINISTS

This handy Speed and Feed Selector will help you in machining stainless steel. Send for one TODAY—IT'S FREE.

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STAINLESS STEEL

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How to prevent fires magnetically

In textile mills, grain elevators, starch mills, mattress plants . . .

Above—everything from snuff cans to pliers—one week's accumulation of iron removed from incoming grain by a Dings magnet at a large mid-western elevator!

ASK your insurance company about the dangers of sparks caused by tramp iron. Records show 12% of industrial fires caused by this source alone! If you have inflammable dust-laden or vapor-laden atmosphere in your plant, think about it next time you read in your newspaper of another disastrous fire or explosion.

Dependable, powerful Dings Magnetic Separators are your best protection. Units approved by Factory Mutual and with Underwriters' Class A ratings are available to meet your exact requirements.

Write to Separation Headquarters for BULLETINS on magnets to meet your needs.

DINGS MAGNETIC SEPARATOR COMPANY
4712 W. Electric Ave., Milwaukee 14, Wis.

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Certified
MAGNETIC STRENGTH

blade assembly mounted on a pivoted arm. Four models are available: Model ADF with a built-in dust collector, a 1½-hp. shielded motor; Models F-12 and F-14 with 12- and 14-in. blades, 1- and 1½-hp. motors respectively. Model WF is suitable for either wet or dry cutting; other models for dry cutting only. Martin Fireproofing Corp., 2200 Military Rd., Buffalo 17, N. Y.

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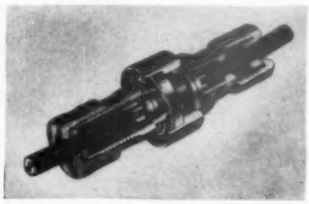

Waterproof Electrical Coupling

Known as the 1600 Series, electrical coupling is said to be impervious to moisture and capable of withstanding long periods of complete immersion under high external pressure without leakage. Manufacturer states that a quarter turn makes or breaks coupling, with no tools required. A variety of electrical inserts are available, made of phenolic material of high dielectric qualities and provided with pressure-tight cable seals or threads for attachment to conduit, bulkheads, or panels. Coupling is fabricated from bronze alloys in a wide range of sizes; can be obtained in other materials, such as aluminum alloy or stainless steel. Roylyn, Inc., 718 W. Wilson Ave., Glendale 3, Calif.

•

Portable Voltage Regulator

Designed for use in testing electrical and electronic components and finished products, portable voltage regulating instrument, called Voltrol, is basically a transformer with windings individually tapped at each turn. Large manually operated knob causes a nonfusing, nonburning self-lubricating contact to travel in an arc, tapping each turn of the winding, to provide full range stepless control from 70 to 130 volts. Device is supplied with indicating voltmeter, 10 ft. cord, and carrying

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Improved

STERLING SLO-SPEED

BALANCED DESIGN FOR EVERY HORSEPOWER RATING

Sterling is as well known for its precision gears as for the advanced engineering in its electric motors. From power intake to drive shaft, Sterling makes motor, gears, and all parts in one modern plant—giving you a highly efficient, slow-speed power unit for the "one best" correct production speed. Thousands of satisfied users are increasing plant profits with Sterling Slo-Speed geared motors.

Send for new informative literature.

UNDIVIDED RESPONSIBILITY . . . Experienced engineering — precision helical gears — liberal ball bearings — splash lubrication — and rugged construction are combined in this one compact, sturdy, dependable unit.

Improved Sterling Slo-Speed geared motors are available with single and double reduction gears in a wide variety of ratios.

Use the improved Sterling Speed-Trol—where "speed control"—faster or slower—is required.

Where constant normal speed is required, use the improved Sterling KLOSD-TITE FAN-COOLED; KLOSD-TITE ENCLOSED; KLOSD-FACE-MOUNTED electric power drives.

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Helps keep your customers satisfied
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. . . engineered shipping containers

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DISTRICT OFFICES AND PLANTS: **Brooklyn, Cincinnati, Detroit, East St. Louis, Kansas City, Louisville, Milwaukee, New Orleans, Sheboygan, Winchendon, Natchez.**
Continental Box Company, Inc.: Houston, Dallas.

handle. Measures 10⅞x6¼x6¼ inches, weighs 15½ pounds. Acme Electric Corp., Cuba, N. Y.

•

Flat Curved Conveyor

Specially designed conveyor chain permits powered flat conveyor, called Flat-Flex, with balanced-weave wire mesh belt, to travel around curves. Manufacturer claims wear on edges is eliminated because belt does not drag against guides. May be used in conjunction with other flat conveyors, or as a complete installation of both straight and curved runs. The Leeds Electric & Mfg. Co., Hartford, Conn.

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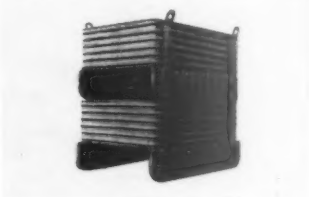

Corrugated Steel Platorm Boxes

Heavy-duty all-steel corrugated platform boxes can be handled and tiered by lift truck. Crane lugs, stacking brackets, and channel runners optional. Size, load capacity, and color of paint to specification. Palmer-Shile Co., 16007 Fullerton Ave., Detroit 27.

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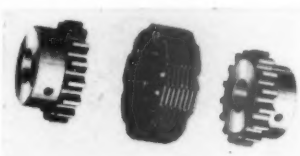
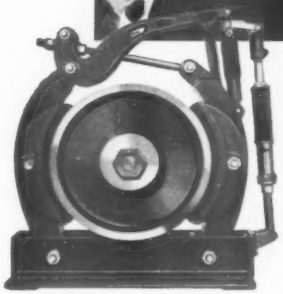


Flexible Couplings

Line of stock silent chain flexible couplings is designated as Series DSC. Their all-steel construction is said to combine maximum power

DON'T LET THIS HAPPEN TO YOUR CRANE . . .



If you now have Wagner brakes, your system can be quickly modernized with our complete conversion kits. You can change your old solenoid-controlled HM brake to the compact, hydraulic type; you can convert a type H brake to an HM; and you can easily add the remote control bleeder to any Wagner system.

Bulletin IU-40 gives full information on Wagner Industrial Brakes—write for copy.

Equip with *WAGNER* Hydraulic Crane-Bridge Brakes for *SAFE, SURE STOPS*

Only Wagner crane-bridge Brakes give you all *these features:*

• A Size and Type for Every Application . . .
Wagner hydraulic crane-bridge brakes are built, with or without parking attachment, in four sizes that are capable of handling any application—from light industrial cranes to the largest steel mill ladle crane.

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Keeps lines full of fluid, even when brake is installed at a considerable height above the control cylinder. Maintains peak braking efficiency, and makes bleeding the system an easy, "one-man" job.

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Prevents brake shoe drag by assuring equal clearance of both brake shoes.

• Other Advantages Include . . .
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Consult Wagner Engineers on all Crane-Bridge Braking Problems

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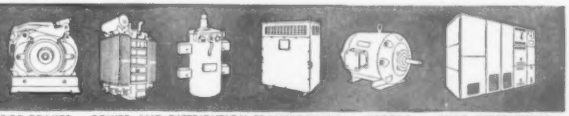

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ELECTRICAL EQUIPMENT AND AUTOMOTIVE BRAKE PRODUCTS

49-2

Snap-on's FAMOUS Ferret Set

Rugged tools . . . . twice as strong as you would expect such slim, streamlined handles and thin-walled sockets to be.

"The Choice of Better Mechanics"

Mechanics like this set because it is way over par in performance . . . the tools are strong and easily adaptable to a variety of jobs.

They squeeze into tight places and get those hard-to-reach nuts and bolts that defy the ordinary type wrench. Recently designed by Snap-on engineers, they have the new features that make fast, easy work of the tough jobs.

INCLUDED IN THE SET: 1/4" and 5/16" single broached sockets; 11 double broached sockets from 3/8" to 7/8"; a speeder wrench, sliding tee, 8" reversible ratchet, nut spinner and universal joint, plus a 3", 6" and 12" extension. All complete in a metal box for only **$27.65**

Present Owners — *Supplement your present set with these special Ferret tools . . . . .*

CLUTCH-TYPE SCREW DRIVER
Handles clutch - type (figure 8) head screws. Built short for easy operation in close quarters.

RATCHET ADAPTOR
Converts any combination of Ferret handle, extension and socket into a reverse action ratcheting tool.

PLASTIC GRIP HANDLE
A shockproof, plastic handle, 5½" long that is ideal for electric work. Makes your Ferret Set more useful.

DOUBLE HEX FLEXOCKETS
Saves a lot of tough work fumbling for hard to get at studs and bolts. Eight sizes: 5/16" to 3/4".

FERRET FLEXTENSION
A flexible steel cable extension connects handle and socket to work around corners and over obstructions.

EXTRA LONG FERRET SPEEDER
36½" long, 27" shank. Radius of sweep is 3½". "Palm-Grip" handle rotates to provide easy operation.

SNAP-ON TOOLS CORPORATION • 8044-H 28th Ave., Kenosha, Wis.

Enclosed find ☐ check ☐ Money order or

☐ Company Purchase Order for the $27.65 Snap-on Ferret Set.

☐ Please send illustrated brochure describing 109 individual Ferret units.

Name.....

Address.....

City.....State.....

transmission capacity with minimum space requirements. Stock bores range from ½ to 2⅞ inches, with capacities up to 119 horsepower at 2000 rpm. Either stamped steel or plastic covers are available. Morse Chain Co., Div. of Borg-Warner Corp., 7601 Central Ave., Detroit 8.

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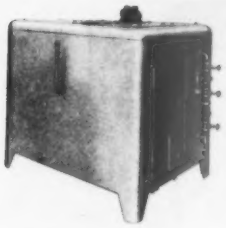

Conditioner for Turbine Oil

Oil-conditioner is designed for use with turbine or other low viscosity, high demulsibility oils which contain rust or oxidation inhibitors. Made in 4 sizes to serve steam turbines from 1000 to 110,000 kw. Solid particles as small as 20 microns in size are said to be removed in the first step of the conditioning process, while the second step filters out particles down to 1 micron in size, as well as moisture or vapor cloud. "Free water" is automatically precipitated and ejected. Lubrication & Filtration Div., Bowser, Inc., Fort Wayne, Ind.

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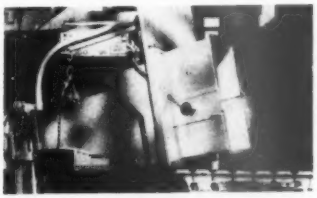

Fork Truck Lifting Boom

Lifting boom for use with manufacturer's 500-lb. capacity Model F-50 fork truck is intended for handling engines, long bars, and bulky or odd-shaped material. Long enough to reach over machinery or stored material, and may be interchanged with the forks. Swivel hook can be fixed in any of six positions on boom. The Buda Co., Dept. LB, Harvey, Ill.

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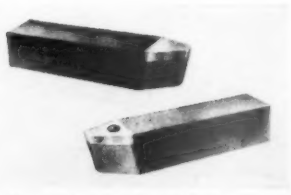

Pulley-Grooving Tools

Tools for machining to dimensions approved by Multiple V-Belt Drive

ACCURACY

STRENGTH

WEAR RESISTANCE

What *Qualities* do you look for in Non-Ferrous BEARINGS and CASTINGS?

You want ALL FOUR, of course . . . and you get ALL FOUR qualities plus better performance and greater long-range economy when you specify N-B-M Bearings and Castings.

SHOCK RESISTANCE

The bearings and castings shown above are typical results of these complete—and modern—facilities that you'll find at National Bearing Division:

Research—

American Brake Shoe's extensive research labs, containing the latest in testing equipment, are always at the disposal of N-B-M for all types of research on customers' problems.

Engineering—

The N-B-M Engineering staff is fully qualified to work either for or with you in solving problems of stress, alloy or over-all design of bearings and castings.

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From precision molding to final machining, N-B-M has the latest manufacturing techniques that assure you of products with maximum strength, precision, wear-resistance and density.

Quality Control—

Modern X-Ray, Photomicrographing equipment, and other latest testing devices provide a surety for you of castings that meet and often exceed your specifications.

Yes, if qualities that insure longer, more economical service are important for the Bearings and Castings used in your plant or product, call in your nearest N-B-M Representative. He will be glad to give you specific information on how this complete N-B-M service can be applied to your problems.

N B M

AMERICAN Brake Shoe COMPANY

NATIONAL BEARING DIVISION

4930 Manchester Avenue • St. Louis 10, Mo.

PLANTS IN: ST. LOUIS, MO. • MEADVILLE, PA. • NILES, OHIO • PORTSMOUTH, VA. • ST. PAUL, MINN. • CHICAGO, ILL.

This is What Ideal INDIANA Offers You...

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4 LABOR 93.5% native-born white and 3.5% negro population makes Indiana one of the finest labor states in the union. Indiana labor has been tested many times, each time proving itself capable of handling the task presented. *You can do a better job with good labor.*

Write today for our booklet, "Industrial Facts about Indiana." *Please give title and company name when writing.*

INDIANA

DEPARTMENT of COMMERCE and PUBLIC RELATIONS

Department IR600 • State House • Indianapolis, Indiana

& Mechanical Power Transmission Assn. are available for cutting grooves for V belts A through E. Grade K6 tips for grooving cast-iron pulleys in two types, brazed-on or held by socket-head cap screw. Kennametal, Inc., Latrobe, Pa.

•

Small Fork Truck

Small fork truck, Model A-1364-203, was created to meet the demand for a compact, maneuverable chassis to operate on small elevators or in congested areas. It is said to retain full rated capacity of manufacturer's standard "Jeep." Wheelbase 33 inches, over-all length when carrying 48-in. pallet, 103 inches. Mercury Mfg. Co., 4110 S. Halsted St., Chicago 9.

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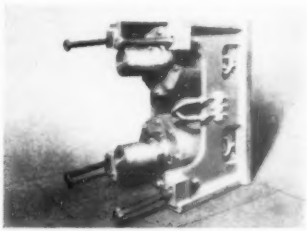

End-Thrust Bearing

End-thrust bearing, for use with conventional plain radial bearings on rod or bar mills, is available as a separately attachable unit for installation on any mill stand where one end of the rolls is open. Said to permit precision control over axial matching of roll passes and to eliminate wearing-type side-thrust collars. Location of roll grooves is said to remain permanent after adjustment. Mackintosh-Hemphill Co., 901 Bingham St., Pittsburgh 3.

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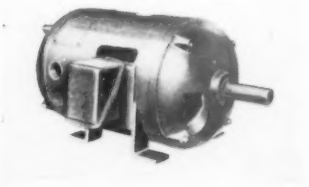
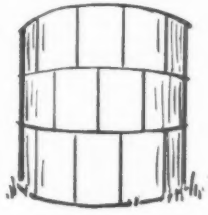


Wound-Rotor Motor

Protector-type wound-rotor motor, Form BW, is built in NEMA frames

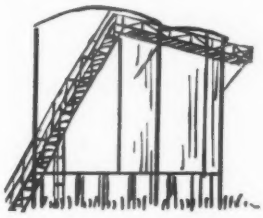
Got a storage problem?

Here are three answers!



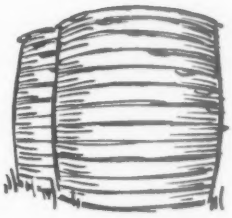
1 BS&B Bolted Tanks

Prefabricated, shipped knocked down. Quickly, easily erected, torn down, and re-erected at new location. Sturdy, adaptable.



2 BS&B Welded Tanks

Exclusive BS&B welding methods assure sturdy tanks and a long life of leak-free service.



3 BS&B Wood Tanks

Ideal for corrosive chemicals. Select redwood is used throughout. Exclusive tongue and groove jointed staves insure tightness.

BS&B can solve your storage problem! There's a type and size BS&B tank to fit your job. Investigate today. Drop coupon in mail now for complete information, specifications, and prices!

BS&B STORAGE TANKS

Special Products Division, Section T-7
BLACK, SIVALLS & BRYSON, INC.
Power and Light Bldg., Kansas City 6, Mo.

● Send full details about ☐ Bolted ☐ Welded ☐ Wood ☐ All tanks.
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ANY WAY YOU
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Pre-tested for Performance
DARNELL CORP. LTD.
LONG BEACH 4, CALIFORNIA
60 WALKER ST., NEW YORK 13, N.Y.
36 N. CLINTON, CHICAGO 6, ILL.

224-505 in ratings up to 100 hp., and in larger frames up to 2000 hp. Frames and end shields are drip-proof, and motors are also available in splashproof and totally enclosed nonventilated models. Other modifications include floor-, sidewall-, and ceiling-mounting assemblies, face and flange mountings. Both face and flange motors are available for horizontal or vertical operation, with or without feet. Suitable for driving conveyors, crushers, presses, fans, centrifugal compressors, or similar equipment. Special windings available for crane and hoist service. Crocker-Wheeler Electric Mfg. Co., Div. of Joshua Hendy Corp., Ampere, N. J.

•

Hand Drier

Manufacturer states that hands will thoroughly dry in 20 seconds under average conditions of 72 degrees room temperature, 50 per cent relative humidity, in hand drier. Over-all dimensions, $11\frac{7}{8} \times 9\frac{5}{8} \times 6\frac{5}{8}$ inches. It is finished in white porcelain-enamel (colors on special order) with chrome-plated exterior fittings. Concealed mounting bolts and semi-concealed cover screws are removable only with special driver, for protection against theft. Connections supplied for 115-volt a.c. circuit. National Dryer Corp., 1125 W. Lake St., Chicago.

•

Limit Switch

Operating head of precision limit switch, called Micro-Limit, may be adjusted to any of four horizontal positions. Roller arm assembly may be reversed to position actuator roller on either side of actuator arm. Switch is field adjustable to operate either clockwise, counter-clockwise, or in both directions. Actuator arm assembly adjustable through 360 degrees; can be locked in any of 870 positions at intervals of 0.4 degrees. Suitable for electrical rating of 20 amperes, 110, 220, or 460 volts a.c.;

How Big is the CORE

Densheath Type TW Building Wire with its special thermoplastic insulation is sound production insurance in any plant. It will not support combustion, is long-aging, impervious to acids, oils and alkalis. It is recognized by the National Electrical Code for circuits up to 600 volts and temperatures up to 140° F. . . . and for wet and oily locations. Being light weight, with a smooth, slick finish and without braid, Densheath pulls through easier . . . resists abrasion. Permanent, bright colors for quick circuit identification. Write for literature.

This is important, too—*for rewiring in existing raceways*, the Code recognizes the smaller diameter of Densheath TW and permits more conductors to be pulled in the same size conduit. Here is a typical case—

½" CONDUIT

Type R	Type TW
3 #10 Wires	6 #10 Wires

# of your POWER apple?

HOW MUCH of the electric power you pay for do you *throw over your shoulder* through overloaded, overextended, obsolete, inadequate wiring?*

Avoid wasting power. Find present losses and safeguard future expansion. Talk to your plant power engineer, consulting engineer, electrical contractor, wholesaler or utility power salesman. It's their job to advise and protect you against slow-downs and shut-downs that mean unproductive wages, lost production, spoilage.

***WIRE AHEAD** . . . a comprehensive discussion of preventive maintenance, points out the symptoms of inadequate wiring, presents detailed plans for anticipating electrical demand. Forty-eight factual pages of practical information and suggestions free on request.

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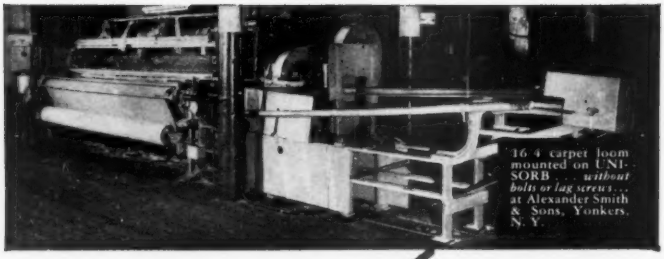
from mine to consumer

ANACONDA WIRE & CABLE COMPANY

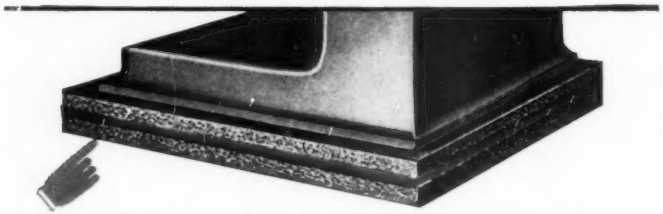
25 Broadway, New York 4, N. Y.



16 4 carpet loom mounted on UNISORB . . . *without bolts or lag screws* . . . at Alexander Smith & Sons, Yonkers, N. Y.

ALEXANDER SMITH MOUNTS LOOMS ON UNISORB

. . . drilling avoided . . . floors saved!



Here's why one of the well-known firms in the textile industry anchors looms, preparatory machinery and finishing machinery the modern way . . . *on UNISORB!*

TRANSMITTED MACHINE NOISE and VIBRATION REDUCED 60% to 85%

Lowers machine and building maintenance costs

Higher speed machine operation often possible

UNISORB ANCHORING REQUIRES NO BOLTS, NO LAG SCREWS

Old-fashioned, destructive floor drilling eliminated

Saves installation time as much as 80%. Labor costs reduced

Maintenance on machine mounting practically eliminated

Clip this coupon, or write us on your letterhead today . . .

THE FELTERS COMPANY

210-A SOUTH STREET, BOSTON 11, MASS.

Offices: New York, Philadelphia, Chicago, Detroit, Cleveland, St. Louis
Sales Representative: San Francisco
Mills: Johnson City, New York; Millbury, Mass.; Jackson, Mich.

Makers of FELTS in all colors, thicknesses, consistencies, qualities . . . for all purposes. Rolls, strips, sheets and precision cut felt parts.

Gentlemen: Please send my free copy of "Why It Pays to Anchor Your Machines with UNISORB." ( )

Please send my free copy of "Felters Precision Cut Felt Parts Manual." ( )

NAME ..... TITLE .....

COMPANY NAME .....

STREET .....

CITY ..... STATE .....

Whatever your industry . . . whatever the nature of the flooring in your plant . . . anchor your machines on UNISORB

½ ampere, 115 volt d.c.; ¼ ampere, 230 volts d.c.; ¾ horsepower, 110 volts a.c.; 1½ horsepower, 220 volts a.c. Micro Switch, Freeport, Ill.

•

Coolant Pump

Motor-driven "Gusher" coolant pump, Model UD-8110, has large multiple inlet cast into upper section of impeller housing and an independent flanged vertical tubular housing between motor and impeller housing. Ample clearance between motor and straight vertical discharge pipe is said to permit use of special length tubular housing to meet various submergence requirements. Standard pump is cast iron; can be furnished in other metals and alloys. Capacity is 25 gpm. at 15-ft. head, 30 at 13-ft., 40 at 10-ft. head, with 1¼-in. discharge; utilizes a ¼-hp. 1725-rpm. motor. The Ruthman Machinery Co., Cincinnati 2, O.

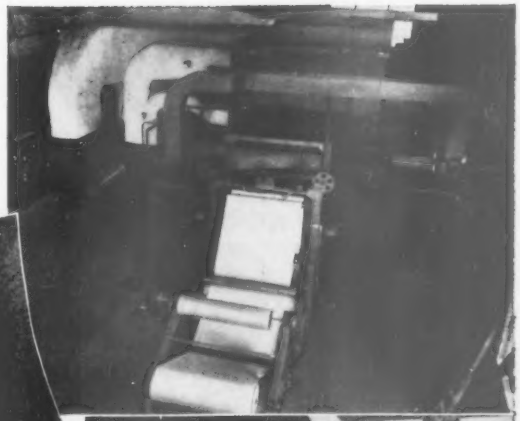
•

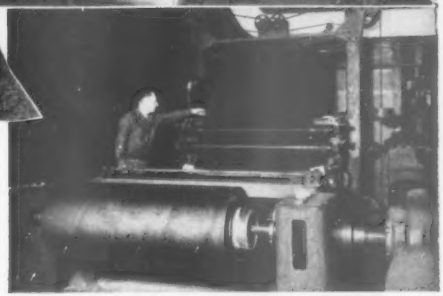
Twin Strainers

Line of twin strainers in sizes up to 24 inches is intended for use in removing foreign matter from water, oil, or other liquids at pressures up to 125 and 250 psi. Constructed with

Gas-fired fabric latexing unit from entering end. Cord fabric passes through the dryer after impregnation with rubber or rubber-like material.

CONTINUOUS FABRIC LATEXING





Impregnated fabric leaves the Gas-fired unit dry enough to be spooled immediately.

Production Drying Operation at INLAND RUBBER CORPORATION

Demonstrates Speed of GAS

LATEX IMPREGNATION is one of the important process applications of heat in which GAS serves so successfully as the high-speed production fuel.

First installation of its type, the continuous latexing system at Inland Rubber Corporation, Chicago, demonstrates efficient utilization of GAS for production-line drying. In this process a water-dispersed material of rubber or rubber-like solids is applied to cotton or rayon tire cord web. The dryer, operating at a speed of 28 yards per minute, reduces moisture content of the impregnated web to less than one per-cent.

Speed-heating with GAS in this modern continuous dryer is an important factor in the tire-cord production line at Inland Rubber Corporation. Executives cite these results—

- **Improved adherence of coating to tire-cord**
- **Minimized non-productive time due to rapid warm-up cycle**
- **Drying efficiency improved by automatic temperature control**
- **Reduction in maintenance costs with simplified equipment**
- **Economies in fuel costs over previous heat-processing medium**

Throughout the textile industry GAS serves the myriad heat-processing needs of production-minded executives. Efficient utilization of this flexible fuel as demonstrated at Inland Rubber Corporation, emphasizes the possibilities for maximum return on an investment in modern Gas Equipment for textile processing. They're worth investigating.

Continuous latexing system designed and installed by Industrial Ovens, Inc., Cleveland, engineers and manufacturers of heat processing equipment.

AMERICAN GAS ASSOCIATION

420 LEXINGTON AVENUE • NEW YORK 17, NEW YORK

IT'S *New!*

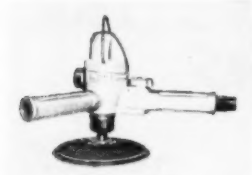
Nothing Like it!

ARO

VERTICAL SANDER

Weighs only

5 lbs.



CORRECT ANGLE of handle in relation to motor housing insures true balance . . . easy handling. Model 7025.

More Power Per Pound

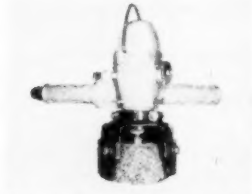
THAN ANY OTHER SANDER

★ **TRUE BALANCE**

★ **CORRECT SANDING SPEED**

★ **LESS AIR PER H. P.**

"Plenty of guts" for your toughest jobs! Gets the work done *faster* and *better!* New streamlined design . . . tough magnesium housing . . . governor controlled speed . . . new exhaust deflects and cools sanding pad . . . helical gears assure smoother operation and longer life. Choice of 7" backing pad, 4" cup grinding wheel with guard, or 5" cup wire brush. Write The Aro Equipment Corporation, Bryan, Ohio or see your nearest ARO distributor.



4" CUP GRINDING WHEEL AND GUARD used for top-speed work with Aro Model 7194.

5" CUP WIRE BRUSH ideal for rust removal and similar jobs with Aro Model 7195.

ARO

AIR TOOLS

Also . . **LUBRICATING EQUIPMENT** . . **HYDRAULIC EQUIPMENT** . . **AIRCRAFT PRODUCTS** . . **GREASE FITTINGS**

two straining chambers, either chamber can be shut off for removing and cleaning strainer basket without interruption of flow. Straight-line flow and large basket area said to provide low pressure drop. Baskets are of hard copper mesh on rigid frames; strainers have cast Meehanite bodies with steel plate doors. Accessories Dept., Elliott Co., Jeannette, Pa.

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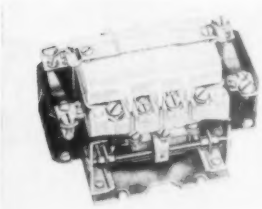

Magnetic Starters

Polyester-type resin compound, called Plaskon Alkyd, is used for molding the bases and protective hoods of line of "RA" magnetic starters. Compound is said to have good arc resistance, high solvent and chemical resistance, and to provide dimensional stability. Does not support combustion; hard surface resists abrasion and is not affected by organic solvents, fats, oils, acids, or water. The Arrow-Hart & Hegeman Electric Co., Hartford, Conn.

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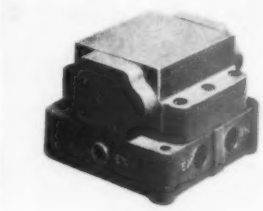


Valve

Four-way "Mastair" valve, balanced spool type, is controlled by one 4-way or two 3-way pilot valves. Straight-line piping may be connected to bottom or sides; parts may be removed without disconnecting the pipe. Spool and sleeve assembly may be taken out by removing end caps. Control pilot valves available in cam, lever, pushbutton, and foot-operated types, in capacities of $\frac{3}{8}$-, $\frac{1}{2}$-, $\frac{3}{4}$-, and 1-in. pipe sizes. Hanna Engineering Works, 1765 Elston Ave., Chicago 22.

Large Rubber-Lined Steel Pipe, Fittings

Large-size steel pipe and fittings lined with saran rubber 187 are available in standard sizes from 8 to 36 inches. Lining, $\frac{1}{8}$-in. thick, is said to be resistant to abrasion and inert to action of petroleum products, chlorinated hydrocarbons, bleaching agents, general acids, and most chemical mixtures. Operating tempera-

"Throw away the book!"

Here are the new Shell soluble oils that can COMPLETELY CHANGE your cutting fluid practice

You have experienced the economy of soluble oils on light machining and drilling jobs . . . Haven't you often wished that this same economy could be extended to your tougher jobs, which have always required expensive conventional cutting oils?

Shell has developed *soluble* oils that replace conventional cutting oils on many heavy duty jobs . . . *even with emulsions as high as 10 to 1.*

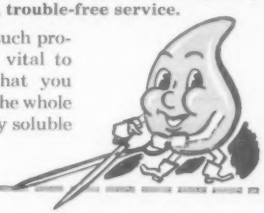
Here are some actual cases:

1. On gun receivers, an expensive cutting oil had been used straight in the milling and profiling operations. One part of a Shell heavy duty soluble oil and 10 parts of water took over the job . . . performed as well as the cutting oil in every respect.

2. In deep drilling, an emulsion of one part of a Shell heavy duty soluble oil in 5 parts of water successfully replaced an oil type cutting fluid . . . at 1/5th the cost!

3. With Bullard Multimatics, on heavy duty turning of steel forgings, a 4 to 1 emulsion of Shell heavy duty soluble oil gave efficient, trouble-free service.

Don't you agree that such production savings are too vital to pass by? We suggest that you mail the coupon now for the whole story on Shell heavy duty soluble oils.



SHELL®

Shell Oil Company, Incorporated
58 West 50th Street, New York 20, N. Y.; or
100 Bush Street, San Francisco 6, California

Gentlemen: Please furnish all available information on the new heavy duty soluble oils.

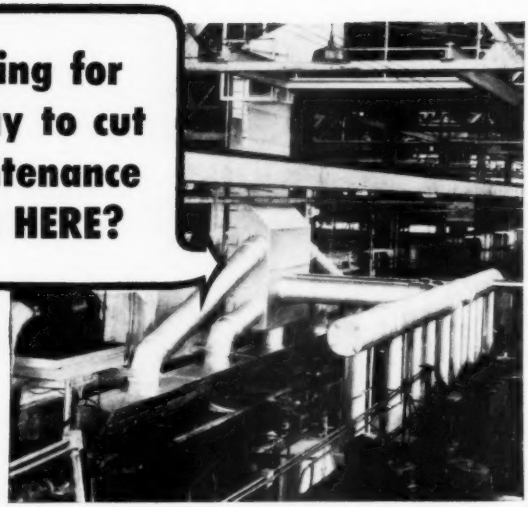
Name_____

Company_____

Address_____

SHELL METAL WORKING OILS

Looking for a way to cut maintenance costs HERE?



. . . Use Transite Industrial Vent Pipe

IF REPLACEMENT of venting equipment is running up your plant maintenance costs, Transite* Industrial Vent Pipe may help you save money.

In numerous installations, this Johns-Manville asbestos-cement product has demonstrated its ability to give long-term, economical service. Rustproof, it successfully resists many of the corrosive fumes, dusts, vapors and gases encountered in industrial venting operations. It requires no painting or other protective treatment—can be used for vents, ducts or stacks, in either indoor or outdoor service.

Transite Industrial Vent Pipe is available in a wide range of sizes (up to 36″ diameter) with a complete line of Transite fittings that adapt it to practically any job requirement. It is light in weight and readily handled—can be cut and drilled on the job with ordinary tools. For additional information, write for Data Sheet, Series DS-336. Address Johns-Manville, Box 290, New York, N. Y.

JM

** Transite is a Johns-Manville registered trade mark.*

Typical industries in which Transite Industrial Vent Pipe is used:

Aircraft	Dairy	Gas	Paint	Shipbuilding
Automobile	Drug	Glass	Petroleum	Shoe
Baking	Electrical	Laboratory	Potash	Smelting
Bleaching	Explosives	Laundry	Pulp & Paper	Soap
Boiler Works	Farm Machinery	Leather	Quarrying	Soft Drink
Brewing	Food	Match	Railroad	Sugar Refining
Canning	Foundry	Meat Packing	Rayon	Textile
Ceramic	Furnace	Metal	Refrigeration	Tool
Chemical	Furniture	Mining	Rubber	Water & Sewage

Johns-Manville TRANSITE Industrial Vent PIPE

tures range from —5 to +167 deg. F., depending on service conditions. Pipes with thinner steel wall sections or with thicker linings to accommodate unusually severe service available on order. The Michigan Pipe Co., Bay City, Mich.

•

Portable Arc Welder

Wilson 200-Ampere Max. MCT, portable a.c. transformer arc welding machine, has a rated output of 200 amperes. It is a self-contained unit, with the welding range divided into two ranges of current adjustment with stepless control. Built-in capacities in the primary circuit are intended for power factor correction; those in the secondary circuit provide arc stability and easy arc starting. Crank handle on top facilitates current setting, which is shown on the full-view scale. Air Reduction Sales Co., 60 E. 42nd St., New York 17.

•

Light-Duty Overhead Conveyor

Small overhead conveyor for light jobs, called "Junior," uses 2-in. pitch chain No. 228, travels on a 3-in. I-beam held by bolted brackets. Said to be very light; can be hung from the average plant ceiling. Chain has an ultimate strength of 8800 pounds. A variety of load-carrying hooks and carriers available. Jervis B. Webb Co., 8951 Alpine Ave., Detroit 4.

•

Insect-Repellent Floor Wax

Substance called Double-Action Kare-33 is said to wax floors to a high gloss, while at the same time killing ants and other insects within 24 hours. Product is a water-emulsion liquid, anti-slip, noncombustible, nonflammable, and water-resistant.

PLENTY of POWER...

for hardest drilling, day after day...

SKIL Drills

It takes tough drills to handle tough drilling jobs! It takes SKIL Drills! They're built for day-in day-out punishment. They have the power, the handling ease, the drilling speed to make every job easier, faster and better. Ask your SKIL Tool Distributor to show you how SKIL Drills will solve your drilling problems. 26 models to fit your needs... to save your time and money.

SKILSAW, INC.
5033 Elston Ave., Chicago 30, Ill.
Factory Branches in Principal Cities
In Canada: SKILTOOLS, LTD.
66 Portland St., Toronto, Ont.

ELECTRIC **SKIL Tools** PNEUMATIC

TRADE MARK

SKIL Tools are made only by Skilsaw, Inc.

Features Like This Make SKIL Drills Right for You!

Powerful, Universal Motors—Balanced, dynamically and statically for smoothest, most dependable operation.

Helical Cut Gears—Precision cut for quiet running and long life.

Bearings—Top quality bearings minimize friction, eliminate vibration.

Aluminum Alloy Body—High-strength, die-cast housings give greater sturdiness and accuracy in fit.

Perfect Balance—Compactness and perfect balance in every SKIL Drill provide maximum handling ease in all drilling positions.

MATERIAL HANDLING *News*

Paper Scoop

Picks up roll of paper from horizontal or vertical position and deposits it either way.

CRANE

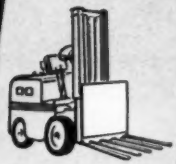
for handling many large, unwieldy items unsuitable for forks or pallets.

RAM

for handling coils or spools of material, castings and many fabricated units.

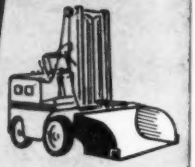
Clamp Lift

for handling boxes or other units that can be gripped securely between the clamping arms.



Brick Fork

for lifting and carrying bricks, concrete blocks and similar products assembled in special patterned units.



SHOVEL

for easy pick-up and dumping of sand, cinders, gravel, coal, aggregate and other bulk material.

These SPECIAL ATTACHMENTS MAKE THE CLARK FORK-LIFT TRUCK *"Many machines in one"*

Inherently versatile, the Clark fork-lift truck, through special attachments to meet specific handling needs, attains far broader usefulness for performing basic materials-handling operations. These attachments, easily and quickly interchangeable with the standard forks, equip the machine to handle items varying widely in size, shape and weight—and often without employing conventional pallets. Benefits immediately realized include faster movement of material, increased storage area, greatly reduced accident rates and elimination of some operations.

YOUR Clark dealer is a man worth knowing—competent to appraise your opportunities for savings, equipped to make unbiased recommendations on how to realize them. It's a sound idea to

CONSULT CLARK

Rotating Forks

useful for handling and dumping containers of scrap and other materials.

PUSHER

a most useful device for pushing loads of certain types from the forks.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIV., **CLARK EQUIPMENT COMPANY** BATTLE CREEK 12, MICH.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

Used like a nonrubbing wax, it is said to dry to a high luster within 20 minutes without buffing and to retain its killing power for from 3 to 6 weeks. Windsor Wax Co., Inc., Hoboken, N. J.

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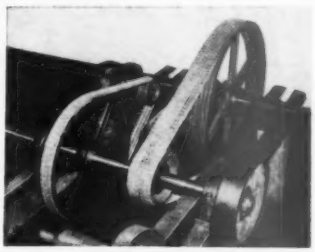


Detachable V Belt

Designed to service emergency breakdowns and eliminate the need for a large endless belt inventory, detachable V belt, called Vee Ply, can be adapted to most V-belt drive applications, according to manufacturer. Suitable for use on drives requiring dismantling a part of the machine to install endless belts. May be used for continuous heavy-duty service, but is not suitable for severe shock loads or for drives that are under-belted. Belting is flexible, may be uncoupled from roll stock as needed, and is adjustable to any length. Multi-V-Drive Sales Div., Worthington Pump & Machinery Corp., Box 953, Buffalo 5, N. Y.

•

Paint Roller

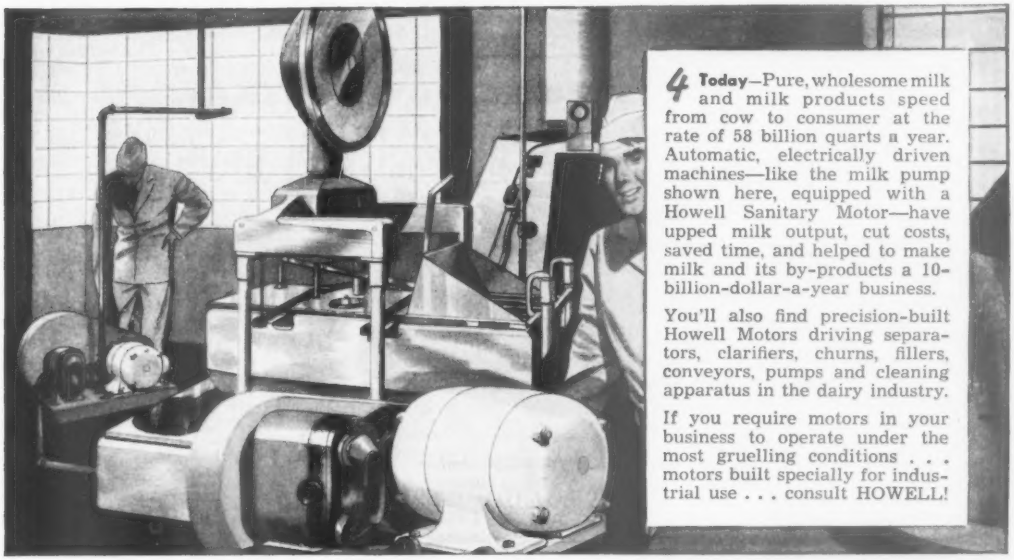
Device called the 400 Pressure-Fed Paint Roller is intended for applying paint to all types of surfaces, rough or smooth. Paint is fed to the roller head, which is covered with lamb's wool, through a hose attached to a 3-gal. paint pot, with built-in pressure system. Rate of paint feed is controlled by a finger-tip valve in the handle. The springy, resilient surface of the lamb's wool cover is said to reach into rough plaster, stucco, and brick, and to leave a

1 **1770**—Improvement of livestock by selective breeding boosted milk output . . . encouraged dairy farming. City folk now began to sample this wonderful beverage. But harmful bacteria in milk caused sickness, spread disease.

2 **1864**—France's Louis Pasteur won world acclaim by discovering how to rid milk of impurities. Milk soon became an important source of food. Vitally needed was electrical horsepower to speed it from farm to consumer.

3 **1915**—The year Howell Electric Motors arrived also marked the widespread use of the automatic rotary bottle filler and capper in the dairy industry. Soon, these rugged, industrial type motors were widely sought in many industries.

MILK . . . 58 BILLION QUARTS ANNUALLY!



4 **Today**—Pure, wholesome milk and milk products speed from cow to consumer at the rate of 58 billion quarts a year. Automatic, electrically driven machines—like the milk pump shown here, equipped with a Howell Sanitary Motor—have upped milk output, cut costs, saved time, and helped to make milk and its by-products a 10-billion-dollar-a-year business.

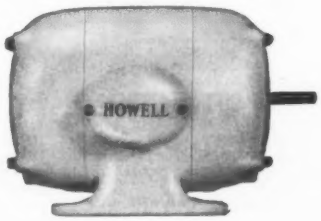
You'll also find precision-built Howell Motors driving separators, clarifiers, churns, fillers, conveyors, pumps and cleaning apparatus in the dairy industry.

If you require motors in your business to operate under the most gruelling conditions . . . motors built specially for industrial use . . . consult HOWELL!

Free enterprise encourages mass production, supplies more jobs — provides more goods for more people at less cost.

SANITARY MOTOR

For dairy and food processing industries. Complies with latest 3-A Sanitary Specifications.



HOWELL MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

Precision-built Industrial Motors Since 1915

HOWELL Red Band MOTORS

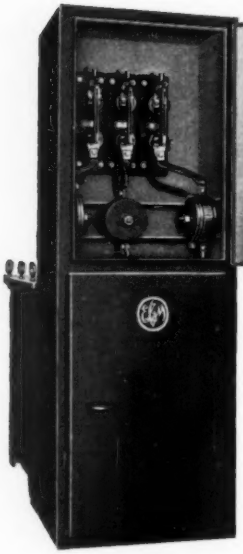
Short Circuit Protection
for 2300-4600 Volt Motors now Simplified

EC&M VALIMITOR Starters

(Trade Mark = Volt-Ampere-Limitor)

1. Eliminate calculation of available KVA.
2. Prevent future revisions as KVA grows.
3. Reduce effect of "short" clear back to the power source.
4. Give permanent protection—no future changes, nothing to replace after a fault.
5. Permit standardized starters suited for circuit of *any* power capability.

MAXIMUM RATINGS		
Squirrel-cage, Synchronous or Wound-rotor Motors		
2300 Volts		4600 Volts
600 HP. 300 HP.	60 Cycles 25 Cycles	600 HP. 250 HP.



Short Circuits get tougher to handle as KVA Grows
Be Safe with ECM VALIMITOR Starters

Switch to ECM VALIMITOR Starters for all these features

1. SHORT CIRCUIT Protection regardless of available KVA.
2. OVERLOAD Protection.
3. LOW VOLTAGE Protection.
4. CUSHIONED STARTING — gives a smoother start and lower inrush current—improving starting conditions—may save cost of more expensive reduced voltage starter.
5. NO REPLACEMENTS to restart, after a fault.

Write for No. 23 ACCELERATOR Issue on these Starters

THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79TH STREET • CLEVELAND 4, OHIO

smooth finish on even surfaces. Roller head is available as a separate unit. Complete outfit includes roller head, pressure tank, pressure gage and air release valve, 16 feet of neoprene paint hose, cleaning unit, and two extra lamb's wool roller covers. The James Warren Co., 1511 W. Florence Ave., Inglewood, Calif.

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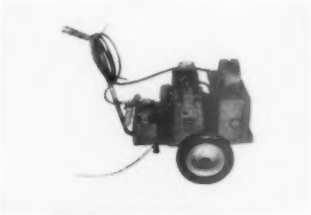

Insecticide Dispenser

Portable insecticide dispenser, called the Super Mistorizer, consists of a ½-hp. compressor unit, a 3-gal. tank, and a pressure-feed hand spray gun, mounted on a 2-wheeled cart. Unit has a 2-nozzle head designed to convert manufacturer's insecticide, called Vaposector Fluid, into a dry mist. Said to dispense particles of insecticide so small they will not wet or condense on walls or equipment. Automatic one-hour interval timer may be set, and the unit left to shut itself off automatically when the room has been completely fogged. It is said to fog 10,000 cu. ft. in 5 minutes, to handle areas up to 50,000 cu. ft., and to contain enough fluid to fog 250,000 cu. ft. of space. Nozzle may be adjusted for local contact or residual spraying. West Disinfecting Co., 42-16 West St., Long Island City 1, N. Y.

•

Lubricant

Soft-consistency grade lubricant, called Summitlube O, developed for textile mill use, is white; suitable for light-duty service in textile mill twister rings and around food machinery. The Texas Co., 135 E. 42nd St., New York 17.

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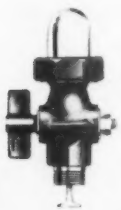


Valve-Type Sight Glass

Valve-type sight glass is designed for observing the clarity or turbidity of transparent liquids flowing through pipe lines under pressure. Differential pressure is established across the deflector to allow some of the liquid to circulate continuously

WHAT DO YOU KNOW about PC Glass Blocks?

DO YOU KNOW that the hollow construction of PC Glass Blocks—in which the sealed-in dead-air space effectively retards heat transfer—offers twice the insulating value of single-glazing? That means that heating costs are cut; that air-conditioning costs are reduced.

DO YOU KNOW that these glass blocks help control temperature and humidity; reduce condensation; that they help to keep delicate machinery in better adjustment? Do you know that they stop infiltration of dust and grit; that they cut noise; give greater privacy; reduce cleaning costs?

DO YOU KNOW that PC Glass Blocks save money on sash? How? By eliminating sash maintenance. There are no costly repairs, replacements, or painting.

. . . **AND** do you know that they admit plenty of diffused, natural daylight over wide working areas, thus increasing your usable floor space?

Yes, they do all this and more. Get the full story by filling in and returning the coupon for your free copy of our informative and revealing booklet. There's no obligation, so why not do it right away?

It's hollow! This forms a partial vacuum, or dead-air space, which gives PC Glass Blocks twice the insulating value of ordinary single-glazed windows.

Pittsburgh Corning Corporation
Dept. H-89, 307 Fourth Avenue
Pittsburgh 22, Pa.

Without obligation on my part, please send me a FREE copy of your booklet on the use of PC Glass Blocks in industrial buildings.

Name.....

Address.....

City..... State.....

PITTSBURGH PC CORNING

GLASS BLOCKS

The mark of a modern building

Distributed by Pittsburgh Plate Glass Company; by W. P. Fuller & Co. on the Pacific Coast, and by Hobbs Glass Ltd. in Canada

Handling Work is STOP and GO...

It's an intermittent service in which battery industrial trucks have many natural advantages. They start instantly, accelerate smoothly, operate quietly, give off no fumes, and consume no power during stops.

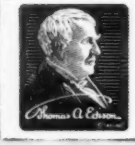
★

Battery trucks "deliver the goods" with double dependability when they are driven by EDISON Nickel - Iron - Alkaline Storage Batteries. With steel cell construction, an electrolyte which preserves steel, and a foolproof electrochemical principle of operation, they are the most durable, trouble-free and long-lived of all batteries.

★

If you do not already use EDISON, get a current price quotation . . . you will probably find initial cost *much lower than you think*; annual operating cost *less than you pay now!*

ADVANTAGES OF EDISON NICKEL-IRON-ALKALINE BATTERIES: They're mechanically durable; electrically foolproof; quickly and easily charged; simple to maintain; not injured by standing idle.



EDISON

Nickel • Iron • Alkaline

STORAGE BATTERIES

EDISON STORAGE BATTERY DIVISION

of Thomas A. Edison, Incorporated, West Orange, N. J.

In Canada: International Equipment Co., Ltd., Montreal and Toronto

through a glass observation bowl, where it may be observed at all times. Shutoff valve permits removal of the observation bowl for cleaning. Worthington Pump & Machinery Corp., Harrison, N. J.

•

Hydraulic Truck Loader

Called the Hydro-Loader, hydraulic lifting mechanism lifts heavy loads, from ground level to 7 ft. or more height, carrying the operator along with the load. Device is actuated from the power take-off on the truck transmission. Finger-tip control. Suitable for handling bulky material, boxes, crates, cans, bales, or drums. When not in use, the device folds flat against the side of the truck, adding only a few inches to its width. Models 750 and 1500 have capacity of 750 and 1500 pounds, respectively. Stratton Equipment Co., Cleveland.

•

Concrete Vibrating Units

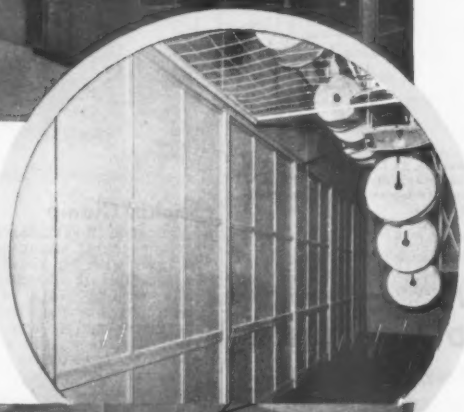
For semi-finishing concrete and mastic floors and driveways, vibrating unit, called Concrete Float, is said to be useful for floating extra low-moisture content concrete; elimination of hand floating dry concrete speeds up process. Units are made up of a 15-lb. pulsating electromagnet vibrator on a 24x30-in. steel float, a 3-section $7\frac{1}{2}$-ft.-long adjustable tubular handle, and a 35-ft. 3-conductor grounded cable. Dial switch permits variation from intense vibration for rough dry concrete to practically none for finishing. The Syntron Co., 480 Lexington Ave., Homer City, Pa.

•

Rotary Pump

Line of rotary pumps known as GAMI employs mechanical seal and self-lubricating-type inboard sleeve bearing to carry overhung drives. Seal and bearing assembly are interchangeable on the same shaft with standard stuffing box of manufacturer's GA-type pump, so substitutions of seal or stuffing box can be made. Suitable for installations re-

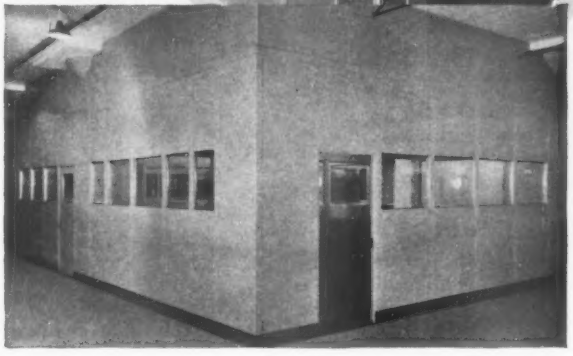
Hauserman Movable Steel Interiors are



Hauserman Glazed, Type K Industrial Partition Kimberly-Clark Corp., Niagara Falls, New York.

Hauserman All Steel, Type K Industrial Partition Kimberly-Clark Corporation, Memphis, Tenn.

Hauserman Glazed, Flush Office Partitions Kimberly-Clark Corp., Niagara Falls, New York.



COMPLETELY INCOMBUSTIBLE

Hauserman Movable Steel Interiors assure adequate fire resistance from baseboard to roof. Steel for frames and panels . . . glass for through vision and borrowed light . . . rockwool insulation for sound absorption and soundproofing . . . mineral board or steel for top fillers . . . all are totally incombustible. Hauserman *Movable* Steel Interiors increase the fire safety and reduce the fire hazard in any building.

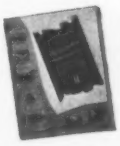
In Addition, Hauserman Interiors assure efficient utilization of all floor areas for the life of the building. Hauserman *Movable* Steel Walls are quickly and easily moved whenever new floor layouts will promote operational efficiencies . . . often in a matter of hours. Whenever Hauserman Walls are moved, all units are completely re-used.

There are Many Reasons why Hauserman *Movable* Steel Interiors are used in the smaller as well as the larger buildings in America. Among these advantages are: 60 Beautiful Colors and Authentic Wood Grain Finishes — Rigid Construction — Excellent Sound Control — Earlier Occupancy — Rock-bottom Maintenance Costs—Ease of Servicing Utilities — Ease of Adding Wires and Outlets — Incombustible Materials — Easy to Move.

Let Us Help You with your interior wall and ceiling problems.

THE E. F. HAUSERMAN COMPANY
6752 GRANT AVENUE • CLEVELAND 5, OHIO
Branch Offices in Principal Cities — See Phone Book

Specialists in Service—We assume undivided responsibility for complete interiors . . . shop drawings, building measurements and installation. We supply all products complete with hardware, wiring accommodations and all accessories. Our experienced erection crews are on call for alterations and additions. Our engineers are always at your service.



FREE CATALOG TO HELP YOU PLAN
You'll find interior walls and ceilings to meet your exact requirements in Hauserman Catalog 49. Write for it on your business letterhead today.

HAUSERMAN
MOVABLE STEEL INTERIORS
WALLS • WAINSCOT • RAILINGS
ACOUSTICAL CEILINGS • COMPLETE ACCESSORIES
For every commercial, industrial and institutional need

HERE'S Your Answer
—TO LOWER COSTS
—TO GREATER SAFETY
On All Jacking Jobs

Use SIMPLEX Ratchet Lowering JACKS

Simplex No. 22 Jack shown above lifts full 10 ton capacity on cap or toe with versatility typical of the complete Simplex line.

SAFER, FASTER ACTION SAVES TIME AND MANPOWER

Maximum power and safety! Easier, faster operation! Greater versatility! Longer service! These are the qualities that put Simplex Ratchet Lowering Jacks at the top of the list today for industries that must save — safely — on repair and maintenance jacking.

Simplex engineering gives these Simplex Jacks the foolproof advantages of a smooth, positive working ratchet and pawl mechanism with adjustable cadmium plated springs, plus rugged construction at every point that adds years to jack life. All models lift full capacity *on cap or toe*. Capacities from 1½ to 35 tons. Send for Bulletin: Industrial 49.

NEW DESIGN! NEW EFFICIENCY!

SIMPLEX HYDRAULIC JACKS

Here's easy acting, *safe* hydraulic jacking power. Simplex Hydraulic Jacks operate in either horizontal or vertical position; are easily portable and produce maximum power with minimum weight. High pressure packing seals of Neoprene; single pump (or double pump on larger capacity models) action; spring controlled, non-sticking valves. Eight models in capacities from 3 to 100 tons. Safety tested to 50% over rated capacities. Send for Bulletin: Hydraulic 48.

Model 100 HJ 100 Tons Cap.

Model 12 HJ 12 Tons Cap.

1899 50th Year 1949

Simplex LEVER · SCREW · HYDRAULIC Jacks

TEMPLETON, KENLY & COMPANY
1018 South Central Ave., Chicago 44, Illinois

quiring high vacuum and a drip-proof construction, and intended for handling liquids comparatively free from abrasive or corrosive substances. However, it is claimed that they are capable of handling liquids containing a considerable amount of air or gas, and of various viscosities, from tar to light liquids such as gasolene. Worthington Pump & Machinery Corp., Harrison, N. J.

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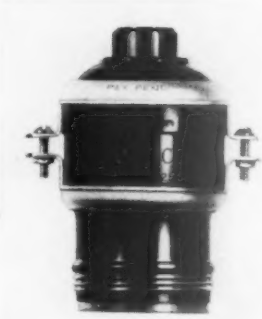

Socket Clamp

Designed to eliminate hazards of broken sockets, clamping device may be used with all standard medium-base sockets. It consists of two identically formed rings of heavy-gage steel; one fits over the socket cap, the other slides over socket shell until it rests on the shoulder. Two machine screws clamp rings together. Vimco Mfg. Co., Inc., 109 Brayton St., Buffalo 13, N. Y.

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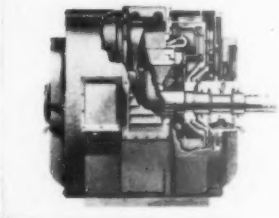


Copper-Finned Induction Motors

Type CS totally enclosed fan-cooled squirrel-cage motors are made with copper fins embedded in the stator laminations for additional cooling. Manufacturer states that interleaving of circular copper punchings at intervals among the core laminations tends to conduct the heat from the stator to the external cooling air. Additional copper fins are fabricated with steel parts to form large cylindrical heat exchangers at both ends of the motor. Suitable for use in dusty atmosphere, but not for outdoor locations where snow or other foreign materials may be encountered in sufficient quantities to obstruct the ventilating openings. Available in large ratings up

You've put your finger on it—

"Dependable"

You can say that again, Mister!

Wherever you see the Hevi-Lift, it's the same reliable workhorse — always ready to take over the heavy loads at the press of a button. You lift and transport anything up to 15 tons . . . and with 5-step variable speed control if you want it.

That's why hoist-wise buyers insist upon the Hevi-Lift for the vital jobs in production — to move their loads in less time, with less effort, at less cost.

The important point is this — the Hevi-Lift is *dependable*. Another product of P&H — America's largest builder of overhead materials handling equipment.

Handle it "thru-the-air" at lower cost!

CAPACITIES UP TO 15 TONS

These ADDED VALUES are Standard Equipment on P&H Hevi-Lifts

SAFER — P&H's true motor ratings insure against failure at full capacity loads and speeds. Thermal overload protection prevents motor burn-outs. Control current reduced to 110 volts at push-button. Crane-type limit switch and double brakes provide maximum safety.

LIFETIME CONSTRUCTION —Precision construction . . . shaved gears . . . grease sealed bearings . . . moisture, dust and acid-proof.

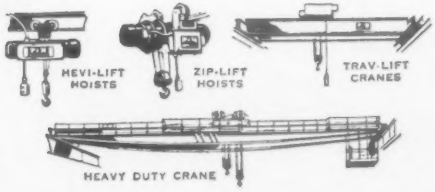
SMOOTHER OPERATION— Motor specifically built for hoist service; high starting torque, frequent reversal. Controls loads within a fraction of an inch.

P&H ELECTRIC HOISTS

4525 West National Avenue
Milwaukee 14, Wis.

HARNISCHFEGER CORPORATION

HOISTS · WELDING ELECTRODES · MOTORS · P&H · EXCAVATORS · ELECTRIC CRANES · ARC WELDERS



"And then we'll cover the whole thing with slip-resistant 4-WAY Safety Plate."

Climbing steps, too, is easier—and *safer*—when they are formed of Inland 4-WAY Safety Plate. 4-WAY's raised lug pattern provides firm, *positive* traction. Install it wherever feet or wheels must go, in your plant or on your product. INLAND STEEL CO., 38 S. Dearborn St., Chicago 3, Illinois.

WRITE FOR BOOKLET

Inland 4-WAY SAFETY PLATE

STOCKED BY LEADING STEEL WAREHOUSES

Reg. U. S. Pat. Off.

to 1500 hp. at 1800 rpm.; class B insulation, 75 degrees C. rise. Westinghouse Electric Corp., Box 868, Pittsburgh 30.

•

Revolving Fork Carriage

Revolving fork carriage attachment called Roto-Worksaver, for manufacturer's line of nontilting Worksaver battery-powered fork trucks rotates a full 360 degrees to empty scrap bins, dump small parts from one bin to another, pour ingredients into mixing or batching equipment, and similar tasks. Bins used in conjunction with the device have short angle iron lugs welded to their sides to form slots into which the truck forks fit. Lever operates rotating mechanism. The Yale & Towne Mfg. Co., Philadelphia Div., 4530 Tacony St., Philadelphia 24.

•

Portable Spotwelder

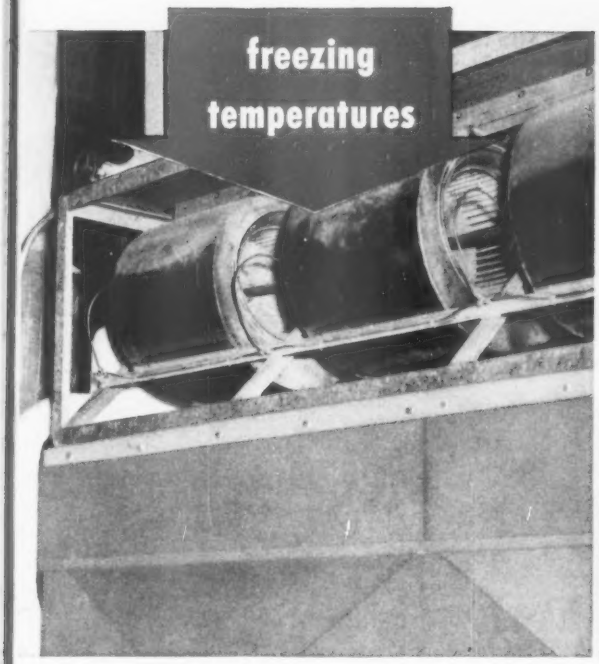
Self-operating portable spotwelder weighs 23 pounds, is suitable for heavy-duty spotwelding as well as for on-the-spot welding jobs in places hard to get at. Self-contained in a cast aluminum housing, one man can carry it to the job. Manufacturer claims it will weld up to $\frac{1}{8}$-in. combined thickness of metal, including stainless steel and mild steel, or 2 pieces of 18-gage galvanized. Interchangeable copper arms available in lengths of 6, 12, and 18 inches; variety of shapes and sizes. Replaceable special alloy tips of various shapes available. Greyhound A.C. Arc Welder Corp., 606 Johnson Ave., Brooklyn 6, N. Y.

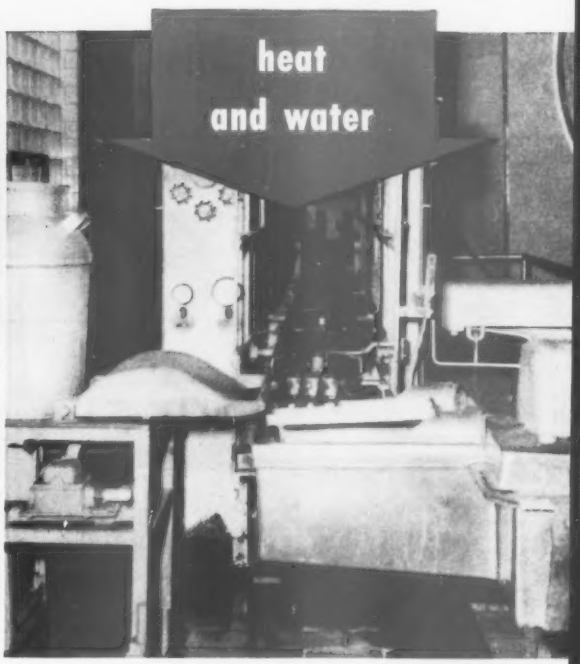
•

Acid- and Oil-Resistant Hose

High-strength fire hose that is resistant to acids, acid fumes, oil, and gasoline, is designed for fire protection and general washdown service. Constructed with a natural rubber tube, two plies of chemically treated cotton cord fabric, and a neoprene cover, hose is said to resist 400 psi. test pressure. It is claimed that the neoprene cover, 5/64 of an inch thick,

Here's ONE grease that withstands





Bearings in electric motors and fan shafts in a midwest cold storage plant are exposed to storage-room temperatures of 32° down to −10° F. The grease, applied by pressure gun, has to flow through ¼" copper tubing to reach the bearings. At the low temperatures, conventional greases continuously gave application and lubrication troubles.

The problem was solved by Stanolith. Despite freezing temperatures, this unique product flowed readily through the tubing and provided safe lubrication for the bearings.

Bearings in the can-washing equipment shown above are subjected to the severe washing action of water at near-boiling temperatures of 180° to 200°F. This combination of heat and water proved too severe for conventional greases and posed a lubrication problem in this midwest plant.

At the suggestion of a Standard Oil Lubrication Engineer, the job was given to Stanolith Grease, a lithium soap product with the unique ability to withstand both heat and water.

In six months' service, Stanolith has provided trouble-free lubrication for the bearings. Moreover, Stanolith has been used successfully for lubrication of bearings in the plant's electric motors and conveyor systems. Its versatility has eliminated the cost and trouble of stocking special lubricants.

Stanolith Grease

If heat, water, or low temperatures interfere with proper lubrication in your plant, try Stanolith Grease. A Standard Oil Lubrication Engineer will be glad to give you more information about this versatile product.

Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY (INDIANA) STANDARD

PRODUCTION or CONSTRUCTION

Planned Lighting is Profitable!

INDUSTRIALITE HIGH MOUNTING FIXTURE
For use in railroad yards and roundhouses, steel mills, foundries—hundreds of heavy industrial installations.

APPLETON LIGHTING EQUIPMENT

To plan lighting with Appleton Lighting Equipment is to more than meet the illuminating requirements of profitable production and lasting electrical construction.

Appleton Lighting Fixtures are manufactured in a variety of types and sizes to fit virtually every industrial job—indoors and out. They are quickly, easily installed, require a minimum of servicing and deliver maximum lighting efficiency at low operating cost.

The Industrialite High Mounting fixture shown above is typical of Appleton specialized design. Ruggedly constructed to deliver top performance under the most severe conditions, this fixture carries a flange on its cast aluminum hood that eliminates the possibility of the reflector jarring loose and falling to the ground.

Custom-made for profitable planned lighting, every one of the products in the Appleton Line of lighting equipment represents the combined result of top quality materials and expert engineering: STANDARD FOR BETTER WIRING.

INDUSTRIALITE ANGLE FIXTURES
Designed to meet the most severe industrial requirements. Supplied with cast aluminum hood which carries flange to prevent reflector from becoming disconnected.

Sold Through Electrical Wholesalers

APPLETON ELECTRIC COMPANY

1715 WELLINGTON AVENUE • CHICAGO 13, ILLINOIS

Branch Offices and Resident Representatives in all Principal Markets

APPLETON

CONDUIT FITTINGS • LIGHTING EQUIPMENT • OUTLET AND SWITCH BOXES
EXPLOSION-PROOF FITTINGS • REELITES

is heavy enough to resist abrasion from concrete pavement, yet light enough to avoid bulkiness. Called "Matchless Carbolized Fire Hose," it is available in either black or white. U. S. Rubber Co., Rockefeller Center, New York 20.

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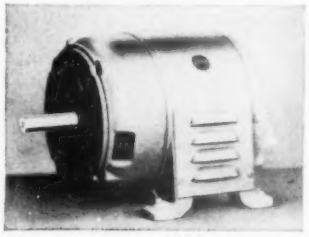

Direct-Mounted Motors

Line of electric motors designed for direct connection to driven machinery is equipped with machined mounting brackets. Designated Unimounted motors, their use eliminates the need for belts, chains, guards, right-angle gears, or other power transmission devices, according to manufacturer. Ratings are from ½ to 500 hp. U. S. Electrical Motors, Inc., Los Angeles 54.

•

Diagonal Cutting Pliers

Line of diagonal cutting pliers in 6- and 7-in. sizes is made of specially hardened drop-forged high-carbon steel. Cutting edges are precision machined, hand sharpened. Large diameter rivets are said to provide smooth action without distortion. J. H. Williams & Co., 400 Vulcan St., Buffalo 7, N. Y.

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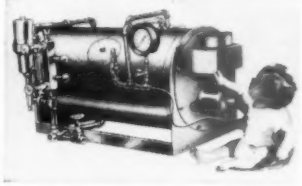


Small-Size Boilers

Available in 3-, 5-, 7-, and 10-hp. capacity, line of miniature Scotch Marine-type boilers is known as the Little Scotchman series. The 3-hp. unit, when fully equipped, measures only slightly over 2x4 ft., less than 2 ft. high. Larger units are only a few inches larger. All models maintain 100 lbs. working pressure, and burn either gas or oil. Steamaster Automatic Boiler Co., 5819 Compton Ave., Los Angeles.

More information about "What's New in Equipment" on page 273

IT'S NO *PIPE* DREAM... THA[illegible] YOU CAN

SWEETEN [illegible] YOUR PROFITS... AND

SCRAP YOUR OLD IDEAS ABOUT

MATERIAL HANDLING COSTS... by using

MODERN LORAIN EQUIPMENT

IT'S A *HOT* SUBJEC[illegible]

SEND FOR THIS *FOLDER* *NOW!*

THEW-LORAIN 50th ANNIVERSARY 1899 1949

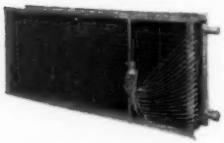
THEW *Lorain*®
MATERIAL HANDLING CRANES

Select Your LORAIN
from 3 series of models —on crawler or rubber-tire single engine self-propelled or two engine Moto-Crane mountings.

MORE FEATURES THAT REALLY COUNT-- IN THESE STURTEVANT HEATERS

REFRIGERATION COMPRESSORS

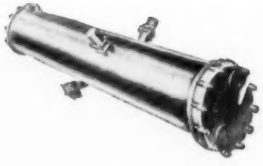
AXIAL FLOW FANS



HEATING AND COOLING COILS

Why? Because these heaters are the product of the combined experience of two great leaders—Westinghouse in electricity; Sturtevant in heating and ventilating. This means, too, that you get undivided responsibility, superior performance and a wide range of capacities to choose from — assuring the most efficient heater to fit your particular needs. For years of uninterrupted heating service, get in touch with your nearest Sturtevant office, or, write Westinghouse Electric Corporation, Sturtevant Division, Hyde Park, Boston 36, Mass.

Everything that puts air to work for Every application

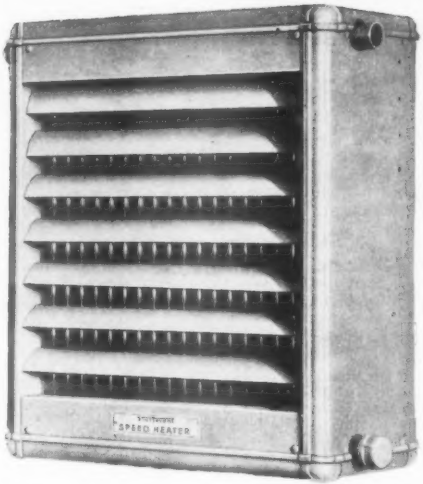


REFRIGERATION CONDENSERS

CENTRIFUGAL FANS

UNIT AIR CONDITIONERS

J-80144

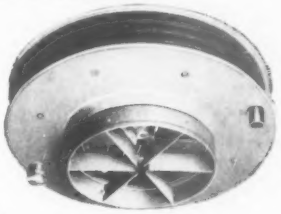


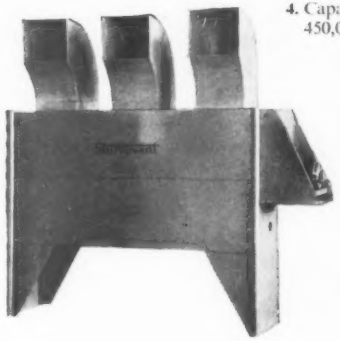
SPEEDHEATER®

1. Fast Heat Delivery—Assured by efficient, quiet-operating fan
2. Low Maintenance Cost—Single-row radiator assures uniform tube expansion, freedom from radiator distortion. Longer life. Tested for 200-lbs. steam pressure
3. Dependable Westinghouse Motor—Backed by nationwide Motor Service Plan
4. Simplified Installation—Inlet and outlet connections on either side
5. Easily formed Handy Hangers—At no extra cost
6. Capacities—From 25,000 to 300,000 Btuh

DOWNBLAST SPEEDHEATER

1. Excellent Heat Distribution for High-ceiling Applications
2. Greatly Reduced Ceiling Heat Loss, Lower Fuel Costs
3. Connections on Both Sides Save Piping Costs
4. Capacities From 40,000 to 450,000 Btuh

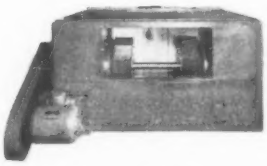




MULTIVANE HEATER

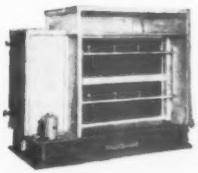
1. Large Volumes of Heated Air, Evenly Distributed
2. Rugged, Simple Construction; Working Parts Easily Accessible
3. Installed on Floor, Wall or Ceiling
4. Capacities, 44,100 to 1,177,000 Btuh

Westinghouse
Sturtevant Division



AIR HANDLING UNITS

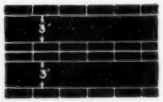
PRECIPITRON®
(ELECTRONIC AIR CLEANER)



SURFACE DEHUMIDIFIERS

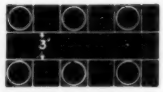
FIGURE IT YOURSELF!

Rotabins reduce storage space



Conventional Floor Layout:

⅔ sq. ft. for storage and 1 sq. ft. for aisles



Rotabin Floor Layout:

2 sq. ft. for storage and 1 sq. ft. for aisles

Rotabins also save time . . .

. . . less time walking
. . . less time looking
. . . less breakage
. . . . less loss

Let F-G-M engineers help you plan most profitable lay-out. Send for copy of Catalog 106-A to:

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YOU WANT TO KNOW

more about the items on this page

Letters to the addresses given will bring you further information.

LIQUID FLOW SLIDE RULE for calculation of pressure drop in pipe lines and tubes, pipe diameter, rate of flow. Solves Fanning equation. Transparent, white Vinylite, $10\frac{1}{2}$x $3\frac{3}{4}$ inches. C. J. Major, 2252 15th St., Wyandotte, Mich.

AIR FRESHENER, called Ozium, neutralizes odors. Glycol formula; packed under pressure into small metal cylinders which fit into $4\frac{3}{4}$x $1\frac{1}{4}$-in. refillable dispenser. Woodlets, Inc., Portland, Pa.

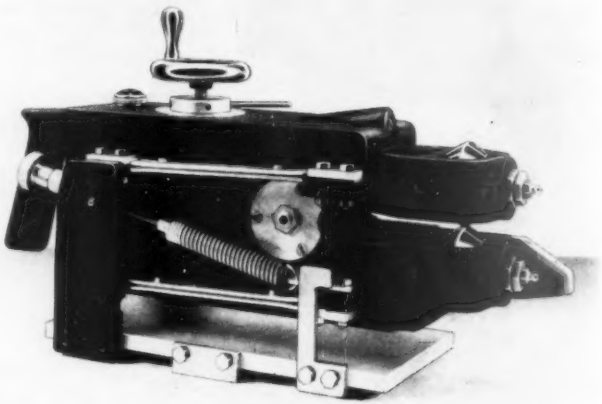
INSECTICIDE PAINT incorporates DDT into its oil base. Said to retain toxicity after repeated cleanings. Available as gloss, semi-gloss, flat, for use in control of insect pests. Sonoco Products Co., Hartsville, S.C.

FOAM BLANKET for sealing in acid pickling fumes, similar gases. Oakite Compound No. 38. Said to minimize fuming of bright dips, acid baths. Oakite Products, Inc., 114A Thames St., New York 6.

INSECT REPELLENT PACKAGING ADHESIVES called Beetle-Pel. For use in sealing and wrapping packages of materials subject to insect infestation, as well as for laminating packaging materials to form repellent barrier. National Adhesives, 270 Madison Ave., New York 16.

COLLAPSIBLE FACE SHIELDS. Transparent plastic, with clear green eye-shading visor. Goggle type or full face. All plastic or fiber and plastic. Leather sweatband, elastic headband. Shield may be thrown back when not in use; friction nuts hold in place. Folds flat for space saving storage. Byrne Industrial Services, Safety Prods. Div., 35 E. Wacker Dr., Chicago 1.

PHOTOGRAPH NEGATIVE IDENTIFIER. "Identograph" automati-



TO PROTECT METAL STAMPING DIES from injury by too-thick metal, continuous limit gage indicates by signal light, control relay, or similar equipment, when strip or sheet is too heavy. When used with die-stamping press, device sends out impulse which stops operation before metal reaches die. Range is from zero to 0.300 of an inch, with accuracy of 0.0005. Pratt & Whitney, Div. Niles-Bement-Pond Co., W. Hartford, Conn.

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In every branch of industry . . . in mines . . . in the oil fields . . . in foundries, food plants and factories . . . everywhere quality hose is required, you can confidently specify Thermoid. *Thermoid makes a complete line of quality hose for every industrial use.*

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Kex Towels are delivered in neat bundles, in desired quantities for easy storage, convenient handling and control of distribution. See your classified telephone directory for nearest KEX Distributor, identified by this trade-mark.

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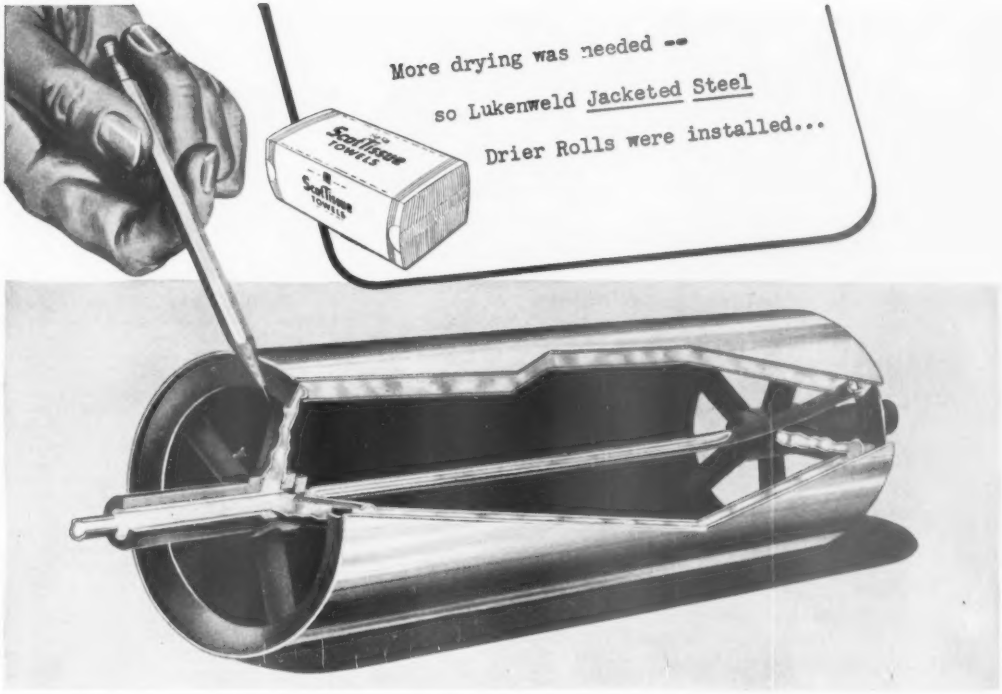
cally prints key numbers on each negative during exposure. Furnished as new camera back to fit any 8x10- or 5x7-in. studio or view camera. May be set to any number up to 9999; special models with additional letters or symbols. Champion Photo Supply Co., 327 Main St., Orange 1, N.J.

READING GLASS shaped like ruler, 8½ inches long; called Magni-Line. Magnifies entire line of type. Lens rests on adjustable supporting stand, leaves hands free, shows reading line, holds place when interrupted. Copy Right Mfg. Corp., 53 Park Pl., New York 7.

LAMINATING PRESS for protecting blueprints, bulletins, operating or safety instructions from dust, grease. Electrically heated platens, hydraulic pressure apply plastic coating. Coats six 8½x11 sheets in 10 minutes in one operation. Studebaker Machine Co., 1221 S. 9th Ave., Maywood, Ill.

PUSHBUTTON-OPERATED FILE CABINET, desk. Mechanized electrical record keeping unit, Robot-Kardex. Holds 4020 sets of records in 60 trays or slides. Operator sits at desktop extension, taps keys of central control panels to draw specific slide required, automatically returning used slide at same time. Visible indexing, colored signaling, automatic computing charts. Slides may be removed if needed elsewhere. Remington Rand, Inc., 315 4th Ave., New York 10.

"FACTS ABOUT GLAZING." Fundamentals of putty and compound



Towel machine at SCOTT PAPER COMPANY reaches an acceptable production rate faster...*with safety*

When engineers at Scott Paper Company required extra drying capacity on a paper towel machine, they installed a number of Lukenweld Jacketed Steel Drier Rolls in the machine.

The needed drying was thus supplied, with an extra dividend of safety due to the welded steel construction of these rolls. They contributed to the successful start-up of the machine and the early attainment of an acceptable rate of production.

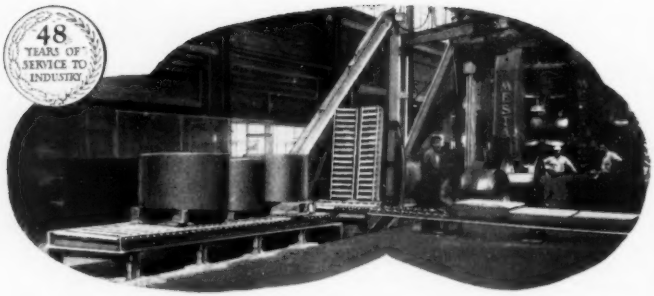
Lukenweld Drier Rolls owe their performance to these factors: Their jacketed design gives positive scavenging of entrapped air, film and condensate from steam passages, assuring high efficiency. Made of steel plate, wall sections can be thinner with safety, giving rapid heat transfer, with even and constant surface temperatures.

Whatever your roll-drying problems, Lukenweld can serve you. Our engineers will help select the rolls you need, and even design and build the complete machine. Pressures up to 350 psi and higher can be safely employed.

Bulletin 358 tells you more about Lukenweld Jacketed Steel Drier Rolls. For a copy, and for help on your machinery requirements write Lukenweld, Division of Lukens Steel Company, 421 Lukens Building, Coatesville, Pa.

LUKENS
LUKENWELD DIVISION

DESIGNERS, ENGINEERS AND MANUFACTURERS OF MACHINERY



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—and Completely Co-ordinated Conveying Systems

Since 1901, Alvey-Ferguson Engineers have helped *all types* of plants make economies in handling materials and products. This 48 years of know-how is at your service. *Why be satisfied with less?* Let us discuss *modern* conveyorized methods with you.

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POSTAGE METER, about size of dial phone, prints postage of any value directly on envelope. Regulation U.S. metered mail imprint, dated postmark, and, optionally, user's advertisement, slogan, or trademark. User dials stamp value needed, presses lever. Built-in moistening mechanism seals envelope. Gummed tape provided for parcel post, bulky pieces. Pitney-Bowes, Inc., Stamford, Conn.

NONWARP GLUE for summer use, humid climates. Cake-form animal-glue-base adhesive. Claimed to hold paper, cardboard assemblies at 100 per cent relative humidity over water at 100 degrees F. without delaminating. Also usable on coated fabrics, leather, felt, cork, other porous materials. Paisley Products, Inc., 630 W. 51st St., New York 19.

BUSINESS MANAGEMENT CHART—a personal scorecard for owners and executives of industry. Comparative analysis of organization, product research, production, distribution, control. Improvements, cost reduction, increasing production per wage dollar. Available on request. Wolf Management Engineering Co., 7 S. Dearborn, Chicago 3.

PROTECTIVE COATING for wood tanks, concrete floors subject to corrosive wear. Liquid and powder combine into mortarlike substance; applied by trowel. Called Carbo-Flex. Thermosetting resin; solidifies in from 2 to 20 hours, depending on temperature. Carboline Co., 7603 Forsythe Blvd., St. Louis 5, Mo.

FILMS:
Microfilms of FACTORY and 14 other McGraw-Hill publications. Available to libraries. One whole volume on single roll, in editions of 30 or more. Comes as positive microfilm on metal reels; suitably labeled. University Microfilms, 313 N. 1st St., Ann Arbor, Mich.

A Hidden World. Story of applications of Allis-Chalmers machinery in fields of electricity, mining, petroleum, paper, chemicals, food, water, transportation, general industry, specialized activities. 16 mm., sound, color; 26 minutes. Allis-Chalmers Mfg. Co., Milwaukee 1.

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DOUBLE REDUCTION WORM GEARS

De Laval double reduction speed reducers, consisting of combinations of double worm gear reductions, or helical and worm gear reductions, are available with overall ratios up to approximately 8000 to 1. De Laval single reduction worm gear speed reducers are available in ratios up to 90 to 1. If high ratios are your requirement, worm gear speed reducers are the answer—particularly if space is limited and reliability is important. A De Laval representative will help you pick the right size and type.

✳ This double reduction De Laval Worm Gear Speed Reducer is available in many standard ratio combinations, with horizontal or vertical output shafts and is but one of 93 sizes and types of standard De Laval Worm Gear Speed Reducers.

Send for Catalog 50-14-J

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Worm Gear Division: **De Laval Steam Turbine Co., Trenton 2, N.J.**

TURBINES • HELICAL GEARS • WORM GEAR SPEED REDUCERS • CENTRIFUGAL PUMPS
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REDUCE COSTLY TANK MAINTENANCE AND OUT-OF-SERVICE TIME DUE TO INTERIOR RUST AND CORROSION

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BELLEVILLE 9, NEW JERSEY

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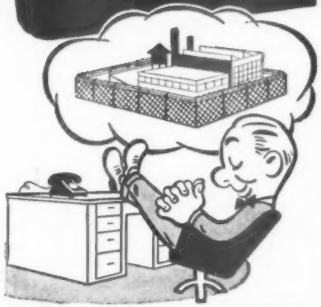

No need to lose any sleep over vandals molesting your industrial property when it's surrounded by a Stewart Chain Link Wire Fence. The All Beam construction of the Stewart fence framework makes it the heaviest and strongest chain link wire fence manufactured. A Stewart Fence will give you the utmost in protection, and many years of dependable, low cost service. Write for Catalog No. 83.

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Experts in Metal Fabrications since 1886

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41% DIVIDEND

IN ONE YEAR*

This Jones & Lamson Turret Lathe will have

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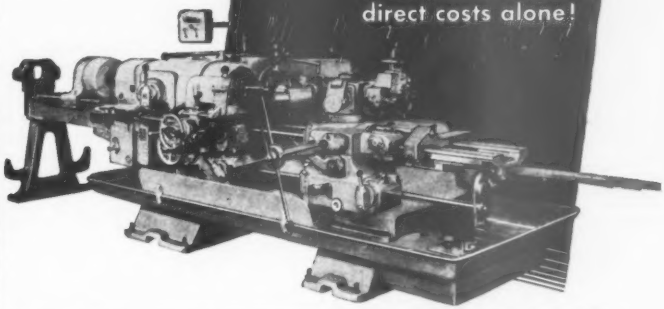
for itself within 2.43 years—through savings in direct costs alone!



*Any investment which produces a 41% dividend the first year is worth looking into! The savings which produced this dividend were revealed by our analysis of a manufacturer's actual turning operations.

Even if your present machines are less than 10 years old, the purchase of a new Jones & Lamson Turret Lathe may be justified through *savings in direct costs alone!*

Let us determine what *YOUR* savings might be—what dividend *YOU* would receive each year from the purchase of a new Jones & Lamson Turret Lathe.

Write to Dept. 710-I for this FREE SERVICE.

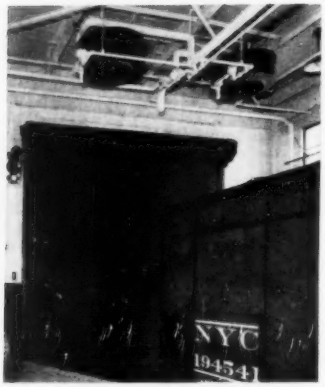
Turret Lathe Division

J&L JONES & LAMSON MACHINE COMPANY Springfield, Vermont, U.S.A.

MACHINE TOOL CRAFTSMEN SINCE 1835

TRANE INDUSTRIAL
Weather Magic

How to Keep Winter Outside that Open Door



Two Trane Projection Unit Heaters automatically neutralize blasts of cold along this "box-car boulevard."

Large outside doors that remain open for extended periods in cold weather are a common cause of worker discomfort, unless drafts are blanketed with warm air.

Unit heaters are ideal for this application, when correctly sized and located. A good way of determining unit heater size is by the "air change" method.

This may be based on approximately 30 air changes per hour, using a cubage determined by the following dimensions: 10' in from outside wall; width of door plus 10'; height of door plus 5'.

Units may be propeller type—either vertical or horizontal discharge—or, if wind pressure is high, blower type.

Details on location of units, automatic controls, and other data are a part of a recently published article on "The Selection and Location of Unit Heaters in Factory Buildings."* The article is a practical, authoritative discussion of industrial unit heating in general. Reprints are available through the Trane sales office in your area, or direct from the factory.

*June, 1949, Heating & Ventilating Magazine

THE TRANE COMPANY
LA CROSSE, WISCONSIN

Manufacturing Engineers of Heating, Ventilating and Air Conditioning Equipment—Unit Heaters, Convector-radiators, Heating and Cooling Coils, Fans, Compressors, Air Conditioners, Unit Ventilators, Special Heat Exchange Equipment, Steam and Hot Water Heating Specialties . . . In Canada, Trane Company of Can., Ltd., Toronto.

SIGNIFICANT LABOR DEVELOPMENTS

BENJAMIN WERNE, Adjunct Professor of Industrial Relations, New York University and a Member of the New York Bar

Period Surveyed: June 1 to July 1

Labor Management Relations

VIOLENT PICKETING ENJOINED

New York Court of Appeals ruled that lower court did not abuse its discretion or violate constitutional rights of union members when it refused to modify an injunction against *all* picketing by the union which sought to exert pressure on plaintiff, when it was undisputed that violence and assault occurred many years after the entry of the original decree. (Enterprise Window Cleaning Co. *v.* Slowuta)

SECONDARY BOYCOTT UNDER STATE STATUTE

The Texas Court of Civil Appeals enjoined picketing by labor unions against an employer whose help was not affiliated with any union nor wished to organize a union of their own. The labor union (Iron Workers & Trade Council), some of whose members were engaged in part of plaintiff's work, disciplined those members who did not cease work on plaintiff's project.

The statute, Section 1 of Article 5154f, provides "that it shall be unlawful for any person to establish, participate in, aid or abet a secondary picketing or a secondary boycott as defined in the article. Section 2d defines the term 'secondary picketing' as being the act of establishing a picket where no labor dispute exists between the employer and his employees. Section 2e defines a secondary boycott as being any concerted action by two or more persons to cause injury or damage to any person for whom they are not employees by (2) picketing such person." (Construction Union *v.* Stephenson)

PICKETING WITH MISREPRESENTING SIGNS ENJOINED

Picketing, though peaceful, where the placards misrepresented the facts, was enjoined by the Pennsylvania Supreme Court, since such picketing is not a lawful exercise of the constitutional right of free speech. Since the union was engaged in an attempt to coerce the employer into performing an unlawful act, namely, to compel employees to join the union under penalty of dismissal if they refused (in violation of the state labor act), such an attempt, even though taking the form of peaceful picketing, was properly enjoined. "Coercion," reasoned the Supreme Court, "is not necessarily limited to threats of violence to a person or his property and may be quite as effective by causing him serious business losses." (Phillips *v.* Carpenters Union, Pa. Sup. Ct.)

SECONDARY BOYCOTT: ALLY DOCTRINE ESTABLISHES PRIMARY DISPUTE

Where there is an allied relationship between two employers, the Labor Law ban against secondary boycotts has no application. A public utility which was picketed had only two customers, one, a lumber company, with which two unions had a dispute over the manning of a logging transport ship. The union's picketing against the utility company was held not to be an illegal secondary boycott, since the utility company and the lumber company had substantially the same managerial control and ownership and the picketing of the utility was directed only against its transportation of the lumber company's lumber. (Boom Co. & Irwin-Lyon Lumber Co., NLRB)

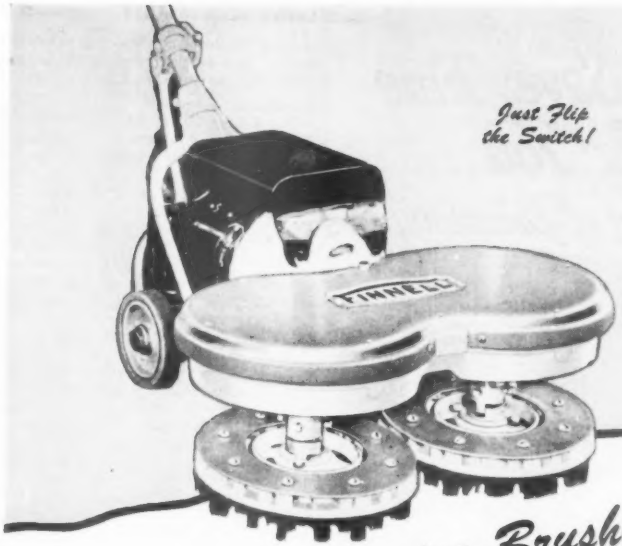
ALLY DOCTRINE APPLIED

The mere fact that a primary boycott may have the effect of a secondary boycott does not render it illegal.

At the time of the strike at Standard Oil Company, which operated petroleum refineries adjacent to Pure Oil, owned the leasehold to dock premises and owned the dock, Standard employees handled shipment of both Standard and Pure Oil Products under an arrangement which called for the sharing of expenses, including all the wages of the dock employees.

When negotiation with Standard broke down, employees called a strike, picketed its dock and refinery, and wrote letters to the National Maritime Union that Standard dock was "hot" and that while Pure Oil cargoes were not hot at Pure Oil Refinery, they were "hot" when they reached Standard dock and the dock was cleared for loading by Standard foremen.

"The appeals contained in the letters," said the NLRB, "no less than the appeals inherent in the picketing by the dock and in the signs which were posted adjacent to the picket line, thus amounted to nothing more



Just Flip the Switch!

Self-Sharpening Brushes

FURTHER THE ECONOMY OF MECHANICAL DRY SCRUBBING

The *Finnell 84-VR* provides mechanical dry scrubbing at its labor-saving best! That is due partially to the fact that this dry scrubber eliminates the need for frequent changing of brushes by hand in order to maintain a good cutting edge. *A flip of the switch* reverses the motion of the brushes and re-sharpens them automatically . . . *while working!*

This heavy duty *Finnell* cleans grease-caked floors in *one-tenth* the time required when hand-spudding, and is far more thorough. Two powerful scarifying brushes dig through and quickly loosen even the most stubborn coatings of dirt, oil, grease, and shavings. Brushes adjust to floor irregularities . . . get into indentations and grooves. Various types and sizes of wire scarifying brushes are interchangeable in the brush rings and, with other rings, the machine can be used for wet scrubbing, steel-wooling, waxing, and polishing. Has heavy duty G. E. Motor, over-size Timken Bearings, special bronze worm gears, leak-proof gear case.

Finnell offers a complete line of *Floor-Maintenance Equipment*, including a *Heavy Duty Vacuum* for wet and dry pickup . . . also *Cleansers, Sealers, Waxes,* and *Accessories* of every requisite type. And the nearby *Finnell man* is readily available for training your maintenance operators in the proper use of *Finnell* equipment and supplies.

For consultation, free floor survey, demonstration, or literature, phone or write nearest *Finnell* branch or Finnell System, Inc., 2508 East Street, Elkhart, Indiana. Branch Offices in all principal cities of the United States and Canada.

Everything FINNELL for Floor Care

Heavy Duty Vacuum for Wet and Dry Pickup

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Pioneers and Specialists in

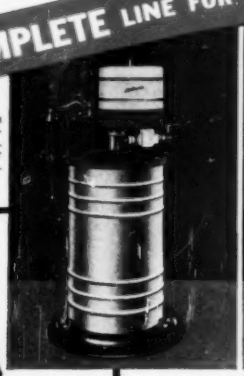
FLOOR-MAINTENANCE EQUIPMENT AND SUPPLIES

BRANCHES IN ALL PRINCIPAL CITIES

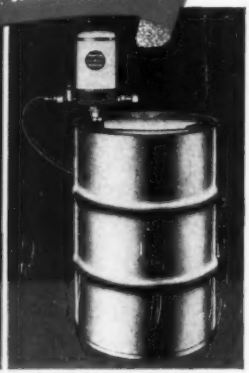
ARO *Saves Time and Labor for You...*

with Fast, Clean Handling of Lubricants!

A COMPLETE LINE FOR INDUSTRY

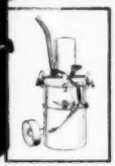


Model 51-DX twin cylinder High Pressure Lubricator . . . air-powered . . . for use with 100 lb. drums.

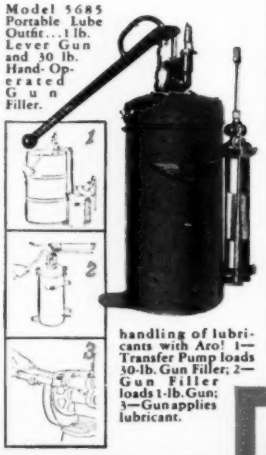


Model 458-E Air-Powered Pump... low pressure...for Bungtype drums of 400 lbs. or less.

Model 5690 Air-Powered Lubricator... available with two-wheel Hand Truck or dolly for easy portability.



Model 5685 Portable Lube Outfit...1 lb. Lever Gun and 30 lb. Hand-Operated Gun Filler.



handling of lubricants with Aro! 1—Transfer Pump loads 30-lb. Gun Filler; 2—Gun Filler loads 1-lb. Gun; 3—Gun applies lubricant.

More production time for your machines — and lower maintenance costs—with ARO Lubricating Equipment throughout your plant! A complete line for your needs in specialized lubrication — any type of machinery or equipment. Each Aro unit expertly engineered . . . assures fast, clean handling of lubricants from drum to fitting . . . positive lubrication . . . with less labor, less waste, lower cost! A few items in the Aro line shown here. See your Aro Jobber or write . . . The Aro Equipment Corp., Bryan, Ohio.

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than a request to respect a primary picket line at the employer's premises." (Pure Oil Co., NLRB)

SECONDARY BOYCOTT

The Federal District Court in New York held that a union's boycott of any place serviced by plaintiff (Trading Corporation) engaged in the operation and servicing of cigarette vending machines, principally in cafes and grilles in New York and New Jersey, was a secondary boycott. The plaintiff, not a member of the Cigarette Merchandisers' Association, which had a closed shop contract with the union, formerly serviced many of the cafes and grilles. The union did not have a primary labor dispute with the cafe and grille owners. An object of the union's activity in the case was "to induce the employees of the picketed taverns and employees of suppliers of these taverns to refuse to perform services in the course of their employment, to induce the tavern owners to cease doing business with plaintiff. As such it would appear that the union has violated the ban on secondary boycott." Product boycotts are prohibited by the Labor Law's ban on secondary boycotts. 8(b) (4) (a) (Parsons *v.* Herzog, D.C. Dist. Ct.)

The New York Supreme Court upheld a company's right to injunction restraining the union, which seeks to compel it to hire its members on certain jobs of the employer, which jobs are held by employees who are members of another union, at rates fixed by the defendant union. The injunction prohibits the defendant union from "calling a strike against, or otherwise directing or requiring the members of Local 580, O.A.I.W., to refuse to work for or picket the place of business or job of third persons, individual or corporate, with whom plaintiff now has, or hereafter may have, contracts to perform fence construction work, solely to enforce or maintain, during any time when said Local 580 is not attempting in good faith to solicit and obtain members for itself from among plaintiff's employees, any secondary boycott against those third persons, either at their regular place of business or at the point where plaintiff is performing fence construction work under said contracts with said persons." (Nash *v.* Mennan)

In enjoining a strike and picketing in furtherance of a secondary boycott, the Court held that peaceful picketing for an illegal purpose may be enjoined and that injunction would lie even though the union refrained from striking when the employer filed suit for injunction, since the union was in position to carry out the threat. (Nash *v.* Mennan)

INTERPRETATION AND ADMINISTRATION OF CONTRACT

1. **Management's rights.** Where the contract does not restrict manage-

WHERE
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COUNTS...

GRATE-X USG EXPANDED METAL FLOOR GRATING

Angular edges grip workman's shoes—prevent slipping

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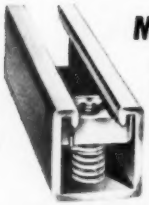

Shown above is a section of the versatile Unistrut Skid and Pallet Rack installation recently erected by The Emerson Electric Mfg. Co. of St. Louis. Here heavy motors, cast-iron pedestal fan bases, fans and various other parts and products are neatly stored on steel strapped pallets and skids awaiting shipment to distributors.

In this highly efficient operation Unistrut's "strength without bulk" provides greatly increased storage space and frees aisles for rapid movement of lift trucks and other essential traffic. Unistrut is 100% adjustable and reusable—may be dismantled and used to meet changing racking needs. This is long range economy.

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LABOR DEVELOPMENTS *(continued)*

ment in the right to subcontract, management has such right, even though employees in the bargaining unit are deprived of overtime work. (International Harvester Co.)

2. **Union's rights.** Management is under obligation to supply the union with a list of hourly rates of pay applicable to each job classification to enable the union to perform its legitimate function of monitoring the application of the contract provisions and to enable it to bargain effectively with respect to merit increases. This does not mean that management is required to furnish the union with a list of rates of pay to specific individual employees. (I. Lewis Cigar Mfg. Co.)

3. **Seniority.** Where the contract permits accumulation of seniority by employees who are outside the bargaining unit, the management may transfer such employees back into the unit without having to negotiate transfers. (Square D Co.)

An employee's seniority is not lost when he is transferred outside the bargaining unit to a supervisory job unless the contract specifically contains such a restrictive clause. (Reeves Pulley Co.)

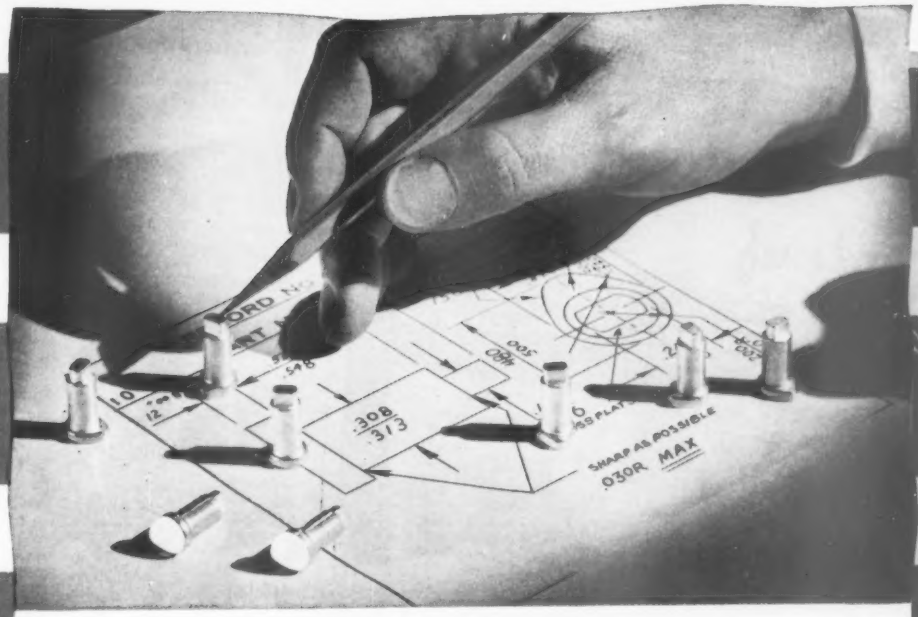
4. **Layoffs.** Layoff for a brief period due to an emergency created by a shortage of material was held not to be governed by seniority restrictions. (Dow Chemical Co.)

5. **Discharge.** Discharge of an employee for his refusal to accept a change in assignment without any reason having been given therefor was held unjustifiable since there was no insubordination nor a flat refusal to obey orders. The arbitrator found that the grievant "was endeavoring to learn why he had been transferred, thinking that he had been unjustly dealt with, and was preparing to file a grievance as provided in the contract." The arbitrator found that management "went to an unjustifiable extreme" in discharging the grievant. (International Harvester Co.)

6. **Discipline.** Employee absent for more than three working days (Saturdays) in any thirty days, without notifying employer of a valid reason, was properly disciplined by loss of seniority. While in this case the normal work week is five days, Monday through Friday, the contract provided that employees shall be considered "called to work" on the sixth or seventh day, if scheduled, when the foreman notifies the employees to report for work on Saturday and this is the practice of the company. (Cone Finishing Co.)

7. **Holiday.** Employee temporarily laid off is not entitled to holiday pay under a contract which requires him to work the day before and the day after holiday where the layoff was not effected to avoid holiday pay. (Chrome-Rite Co.)

Under a contract which requires



Reid Products Saves $15,816 Per Year By Using One Townsend Cold-Headed Part

The little cam above is doing the job of a more expensive part and doing it just as well. The Reid Products Division of Standard Products Company of Cleveland wanted this part for an automobile door lock assembly but found it would cost $38.50 per 1,000 if produced on automatic screw machines. The same part, with its close tolerance and eccentric shape, is being cold headed and cadmium plated for them by Townsend Company for only $25.32 per 1,000. This clear saving of $13.18 per 1,000 becomes mighty important at the rate of 100,000 parts per month. It adds up to $15,816 per year.

This is just one example of the way Reid Products has been cutting production costs by working with Townsend engineers. Other items are being made for them at savings of $.70, $10.01, and even as much as $21.97 per 1,000. These are typical examples. Some Townsend customers save more.

Designers who seek ways to reduce costs find it pays to call on Townsend for small parts. They can be cold headed, pointed, machined, drilled, slotted, trimmed, roll threaded, extruded, pierced, knurled, bent or flattened. Townsend makes parts and fasteners in carbon, alloy and stainless steels—in brass, bronze, copper, aluminum—in a variety of platings and finishes.

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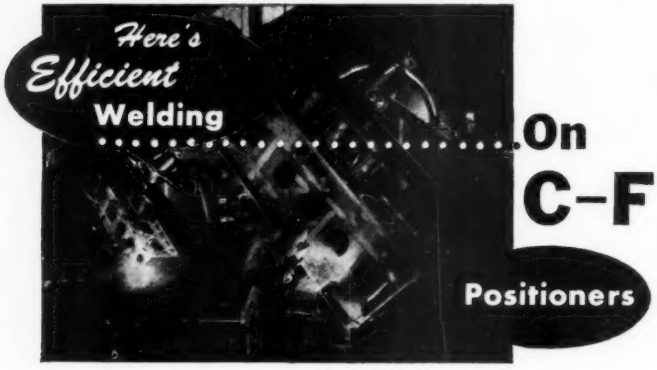

When heavy, unwieldy weldments like these diesel crank cases can be quickly swung into any position so that every weld is made downhand—that's efficient welding!

Welders spend more time welding—do better welding at lower cost when they work with C-F Positioners because these hand and/or power operated machines reduce positioning time to a minimum. Investigate the cost-saving advantages of *C-F* Positioners. They pay their way in any company.

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that an employee work on the last scheduled day before the holiday, holiday pay was forfeited when the employee failed to report on a premium day. In this case the employee worked Friday before Labor Day, while Saturday was scheduled as a work day, where the employees were notified and the management had the right to schedule overtime. The word "scheduled" means, said the arbitrator, that a plan was made by the superintendent in advance for them to work on that day (on September 3), was transmitted to the foremen, and the grievants were properly notified. (Great Lakes Spring Corp.)

8. **Vacation.** Where contract bases eligibility for vacation on the requirement that the employee be "continuously in the employ of the company" relatively brief layoffs do not make an employee ineligible for vacation, in view of the fact that the ambiguous language had been treated by the parties in the past as entitling the employee to vacation despite layoffs. (Eastern Stainless Steel Corp.)

9. **Overtime pay.** Where the contract provides that an employee temporarily transferred to a lower-rated job shall receive his regular rate of pay, an employee so transferred is entitled for overtime work outside of the work week to overtime pay based on his regular rate of pay rather than overtime based on time and one-half the lower rate of pay for the particular job. (International Harvester Co.)

10. **Technological displacements.** Where as a result of technological changes jobs are abolished and work is reduced, management is under obligation to negotiate with the union the issue of workloads. Where, however, presses were reconditioned to operate at a uniform speed slightly increasing the workload but in effect restoring the presses to their normal operating efficiency, management was under no obligation to negotiate the matter with the union. (National Tile & Mfg. Co.)

HELD REFUSAL TO BARGAIN:

Where there was no bona fide doubt on the part of the employer as to the majority of the union which was established at a pre-hearing election, the employer having engaged in a series of dilatory and evasive measures, reduced the hours of the employees' work, retaining the same wage level, without consulting the union. (Tenn. Valley Broadcast Co., NLRB)

An employer's refusal to bargain with a certified union despite a state court's order restraining the employer from breaching its contract with a rival union, since the federal law is paramount and, regardless of the company's possible good faith in

Any way you look at it, a poor wiring system cuts lighting efficiency . . . causes headaches for plant electricians and maintenance men as well as for production workers.

Improving plant lighting and reducing maintenance costs are important functions of General Electric wiring materials. Exciting new products and a full line of old standbys make General Electric the right choice for every wiring requirement.

1. **NEW G-E REMOTE CONTROL** wiring puts switches for various lights in many convenient locations. Master panel can be located at production head's desk. Banks of switches can also be located at convenient points in the shop for local control. This flexible, new wiring system also permits control of any or all lights from distant locations, such as other offices or a master-control point. The G-E remote control wiring system makes multi-point switching economical and easy to put in.

2. **G-E REMOTE CONTROL WIRE**—lightweight, with two or three conductors—was specially designed for remote control wiring. This trim-looking wire can be installed either concealed or exposed—makes a neat installation when it's run along wall surfaces. It permits remote control switches to be placed practically anywhere. The use of a low-voltage relay makes this small-size wire practical.

3. **AVA POWER CABLE** is a natural for bringing in power to a high-level lighting installation like this. And, when you think of power cables, think of General Electric Deltabeston* cables. They'll save you maintenance grief, because they're built to beat ambient and operating heat. They can help you save space, too, because they are designed to carry more current than ordinary cables of the same size.

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4. **TYPE TW WIRE** is recommended for installation in raceways. Smooth-finished G-E Type TW can be cut and stripped with little effort—pulls through conduit easily when wiring changes are necessary. Small diameter and long life are features of this G-E thermoplastic wire—use it to help your wiring system stay modern.

5. **CONDUIT,** of course, should be General Electric "White"—the rigid conduit that's *hot-dip* galvanized for extra protection. High-grade steel—galvanized inside and out, and lacquer-coated—gives you maximum wiring protection with a minimum of maintenance. Remember to specify "G-E White."

Your distributor of General Electric construction materials can supply you with any of these materials, or with any of thousands of other items from the General Electric line. For more information, contact him, or write to Section K-17-834, Construction Materials Department, General Electric Company, Bridgeport 2, Connecticut.

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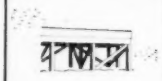
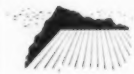

Foundations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3. Where wood is in contact with damp concrete or masonry.
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LABOR DEVELOPMENTS *(continued)*

refusing to bargain because of the state court order, it was guilty of violating the Federal Act. (Grace Co., NLRB)

An employer who, without consulting employees' collective bargaining representation, put into effect for most of its employees who had been represented in the bargaining negotiations a general increase in rates of pay, which was substantially greater than any that the employer had offered. (NLRB *v.* Crompton-Highland Mills, U.S. Sup. Ct.)

HELD NOT REFUSAL TO BARGAIN:

Where company refused to bargain with union after the union gave it 24 hours within which to agree upon a far-reaching demand without compliance with Section 8(d) of the Labor Act and by calling a strike when company refused its proposal, in violation of a no-strike clause of the contract. (Boeing Airplane Co. *v.* NLRB)

Refusal by employer to negotiate with reference to union security. (NLRB *v.* Andrew Jergens Co., C.C.A.-9)

DISCHARGE HELD NOT DISCRIMINATORY:

When employee admitted violation of company rule concerning absence and neglect of work. (Cedartown Yarn Mills, Inc., NLRB)

Spokesman-leader of employees for "loafing" where management was not aware of any concerted activities such as would come under the protection of the Labor Act, not justified. (Myers Products Corp.)

For use by employees of obnoxious language on the picket line, particularly since other employees would not work if the offending employees were reinstated. (C.C.A., NLRB *v.* Wytheville)

DISCHARGE HELD DISCRIMINATORY:

For dual unionism. (Horn Mfg. Co., NLRB)

For insubordination which was deliberately contrived by employer to get rid of an employee because of her union activities. (L & H Shirt Co., NLRB)

Discharge of union employees under the guise of layoff for business reasons where the layoff was a discharge as evidenced by the fact (1) that the employer advertised for help to perform the work of the employees discharged; (2) that the employer hired many new employees; (3) that the employer offered no reason for not calling them back when they were "laid off," although he offered one reinstatement and another was rehired after the complaint was issued. (Joy Togs, Inc., NLRB)

Discharge of employees for failure to become members of the contracting union pursuant to a union shop contract where the unit was inappropriate. The unit was based on a memorandum of agreement affecting one plant and was sought to

FOR THE FIRST TIME!

Electronic alignment of swivel table on grinding machines

HERE IS A UNIQUE AID that permits accurate alignment of swivel table for straight or tapered work after only *one* preliminary grind. ELECTRALIGN eliminates costly, time-consuming cut-and-try operations. It's an important means for avoiding spoiled work, particularly where only .002" to .003" is left for finish grinding.

This exclusive arrangement for Brown & Sharpe Grinding Machines uses a highly-sensitive strain gage to detect swivel table movement and an electronic amplifier to magnify movements to large scale readings. Displacements of .0001" are easily detected. Deflections are direct reading . . . no interpolation or transposition of figures needed.

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- **Accurate table settings easily made.**
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Conveniently located amplifier of the *Electralign* magnifies small angular table movements to large scale readings. Shows any shift in table setting during grinding operation. Permits correction at any time during operation.

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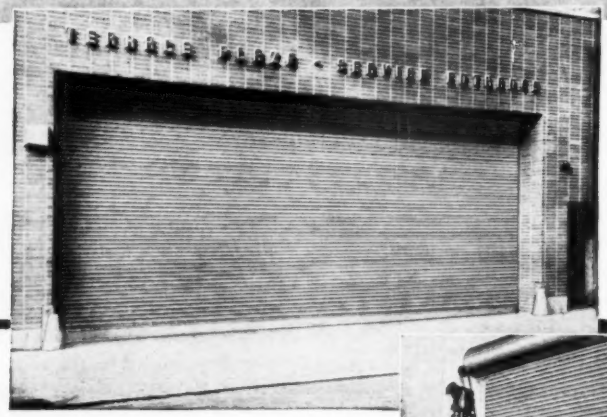


The Interlocking Steel-Slat Door *was originated by Kinnear!*

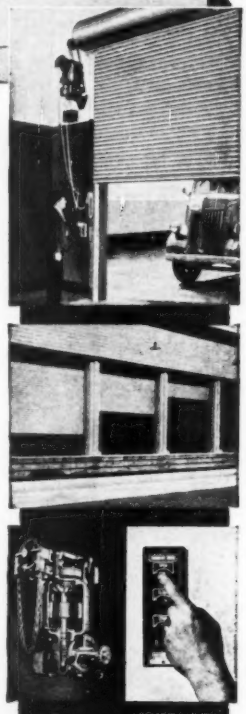
KINNEAR ROLLING DOORS feature the famous interlocking steel-slat curtain that brings highest efficiency to service openings of every type. With smooth, easy coiling upward action, they glide out of the way overhead, safe from damage. Doorways remain clear—from jamb to jamb *and* from floor to lintel—until the doors are closed again.

All wall and floor areas *surrounding* the opening are fully usable at all times. Materials or merchandise can be stored within an inch or two of the door curtain, on either *or both* sides, without impeding its action.

The tough, flexible, all-steel construction of Kinnear Rolling Doors gives them longer service life, cuts maintenance costs to rock-bottom, and assures extra resistance to weather, wear, fire and intrusion.

For added ease and speed of operation, Kinnear Steel Rolling Doors can be equipped with Kinnear Motor Operators. Pushbutton controls may be placed at the door jamb, as well as at one or more remote points. A single control panel may be used to operate several doors, when desired.

Kinnear Rolling Doors can be tailored to fit any opening, in old or new construction. Manual, chain, or crank operation is available where the advantages of motorized doors are not required. *Write for the Kinnear Catalog, or for recommendations on your particular door needs.*



The husky Kinnear Motor Operator, controlled by pushbutton, permits you to raise, lower or stop the door from any number of convenient points.

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KINNEAR ROLLING DOORS

LABOR DEVELOPMENTS *(continued)*

include prospective employees at another contemplated plant without the employees of the latter plant having indicated a desire for such a unit in the exercise of rights guaranteed them in Section 7 of the Labor Act. (Chicago Freight Car & Parts Co., NLRB)

Employer's refusal to hire applicants not referred to him by the union with which the employer had an agreement to supply all men, nor would the NLRB take judicial notice of the fact that such hiring practices are a general custom in the construction industry. The Board has "no authority to engraft exceptions upon the congressional enactment because this now unlawful practice was sanctioned by custom in this particular industry before 1947 or may be thought economically desirable or necessary." (Daniel Hamm Drayage Co., NLRB)

HELD INTERFERENCE:

Conduct of supervisors in questioning employees as to their union affiliation during the week preceding a consent election. (Cedartown Yarn Mills, Inc., NLRB)

Questioning employees about union sympathies and attitudes. (Solomon Co., Foremost Dairies Inc., NLRB)

Questioning of employees by forelady or plant manager as to employees' union membership and activities and threats that employer would close plant and move to some other state. (L & H Shirt Co., NLRB)

HELD NOT INTERFERENCE

An employer is absolved of interference charged because he handled grievances brought by three officers of an inside union when an outside union was seeking to organize the plant. While the grievances handled did have application to the entire plant, the Board finds, they directly concerned the officers and the employer made it clear that he was talking to them as employees and not as officers of the inside union. (North Electric Mfg. Co., UAW, CIO; NLRB)

JURISDICTIONAL DISPUTE

A temporary injunction was granted in a jurisdictional dispute over assignment of work pending determination by the Labor Board. (LeBaron *v.* Building Trades Council, D.C. S. Calif.)

JURISDICTIONAL DISPUTE OVER ASSIGNMENT OF WORK

A union and its agents were enjoined from picketing shipping operations of the employer in an effort to compel him to withdraw work in connection with loading operations from the jurisdiction of woodworkers union and give it to their own members — longshoremen — unless the longshoremen's union was certified by the Board as the bargaining representative for the employees performing such work. (Graham *v.* Longshoremen's Union, D.C. Alaska)

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Westinghouse

MOTOR EXCHANGE SERVICE

For Westinghouse
single-phase and three-phase
1 to 20 hp
frame 203 to 326 a-c motors

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The Broadest Exchange Plan!

Since February, 1949, Life-Line motors have offered you the broadest exchange plan in industry. All 1 to 20-hp, single-phase and three-phase a-c motors in frame 203 to 326 are included. No other manufacturer of motors—large or small—provides exchange service that compares in scope to this new Life-Line Motor Exchange Service.

120 Westinghouse exchange points assure you rush motor replacement service anywhere in the United States. Replacement motors, covered by this plan, are in stock, ready to be speeded to you at any time.

And what's more, if a motor fails during warranty period, it may be exchanged *free* for a motor of identical rating. The *exchange price,* beyond warranty, *is not dependent on the time in service . . . one year, five years or ten years.*

This service is one more advantage you get with Life-Line motors. Add this to all-steel construction . . . pre-lubricated bearings . . . an indicated savings of $750 per year per 100 motors . . . and you'll see why Life-Line has gained leading acceptance in the motor industry.

Complete details on the Life-Line Exchange Service—lists of exchange points and motor ratings covered—are given in the new booklet SM-5243. Get your copy today from your nearby Westinghouse representative or write direct to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna. J-21533

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By simply changing pump speeds, Gorman-Rupp adapts just five pump sizes, 1½" to 6", to an almost unlimited number of conditions, ranging up to 1200 GPM and heads up to 110 feet. Also close-coupled units and flexible coupling drives.

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SPECIAL PORTELVATORS
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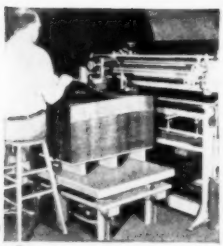

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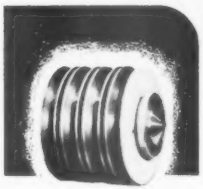

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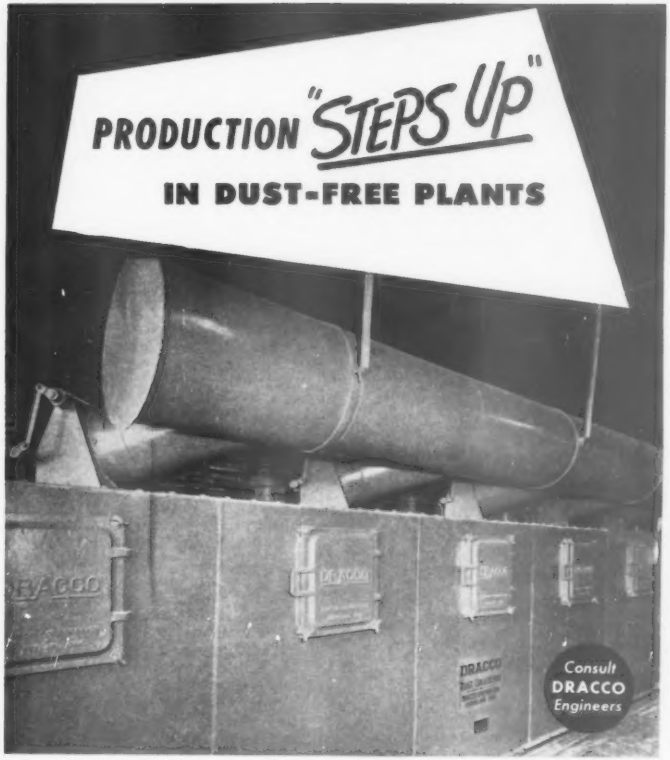

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THEY SAY AND DO

How Business Can Gain Confidence of Labor

Editor's Note: Although FACTORY rarely publishes letters from its readers, we believe the ideas expressed in this letter worthy of widespread discussion.

Dear Mr. Morrow:

Your editorial in the April issue of FACTORY, "Industrial Peace Can Be Speeded by Working from the Bottom Up," is indeed inspiring to an engineer who has spent some 24 years in industry and who began advocating this idea in 1936 when it was so evident what we were facing.

Looking back over the growth of our industry and nation we notice one thing in common. When companies were small, the top executives (usually the founders) took leading roles in their businesses or communities and knew personally each individual involved. They knew how they thought and to what each one would respond. Thus they were able to develop a unified movement in either business or local government.

What happened?

1. Pulling together they prospered and grew until there were not enough top-notch executives to reach all types of workers and classes in the various communities.

2. The sons of these men grew up apart from the workingman, in most cases, and could not understand how he thought and what was important to him.

3. The 18th Amendment was passed through the efforts of a minority group of reformers. The result was the beginning of corrupt law enforcement in the country.

What can we do?

1. Big business can gain the confidence of the workingman by making the job of the supervisor the key job in his business. Many companies think they are doing this now by passing out volumes of theory on supervision and nothing about the details of the company's activities. Managements often feel they don't have time to do this, but they are going to have to take time if they wish to lead their own employees.

2. Each community, by selecting leading citizens for all local offices, can create a feeling of security among all groups by assigning them definite duties and making them feel they are a part of all activities. Men with a little ego are not worried about what may happen to them. When communities feel secure they will not be looking to Washington to legislate gifts or grants for them.

Conclusions:

1. The confidence of the workingman can be won and influenced by honest effort and education of group leaders.

2. Good sound local government can bring good sound national government.

3. Big business is or can become best suited to take such leadership.

4. Executives will be compelled to spend more time in clubs and other direct contact groups to get the desired result.

5. Remember the little man's ego.

J. F. HODGE
Supt. of Construction
Spencer Chemical Co.
Pittsburg, Kan.

Students Run Business for a Day

Some 300 teen-agers recently moved-in on one of America's corporations and took it over lock-stock-and-barrel for the first observance of "A Day in Modern Industry."

Johnson & Johnson, surgical dressings manufacturers in New Brunswick, N.J., believes it is the first major concern in industrial history to open its gates and give high school seniors responsible positions, from chairman of the board down to clerks, and let them run the business for a day.

In undertaking this educational project, officials of the company wanted to dispel some of the bugaboos the younger generation may have about American business. In actually working at jobs of their own choosing, these youths had a chance to try out the type of work they were interested in.

Regular Johnson & Johnson employees benefited too. They report that students' questions caused them to develop better conceptions of their jobs. Each student occupied his position voluntarily.

Recently representatives of the company's personnel department, working in close coordination with school authorities, coached seniors at local high schools, advising them of the many jobs available. Each interested girl and boy was asked to indicate on a card first and second choice of job desired. Most of them got what they asked for. The other few gladly accepted their second choice jobs. Johnson & Johnson is planning to make "A Day in Modern Industry" an annual affair.

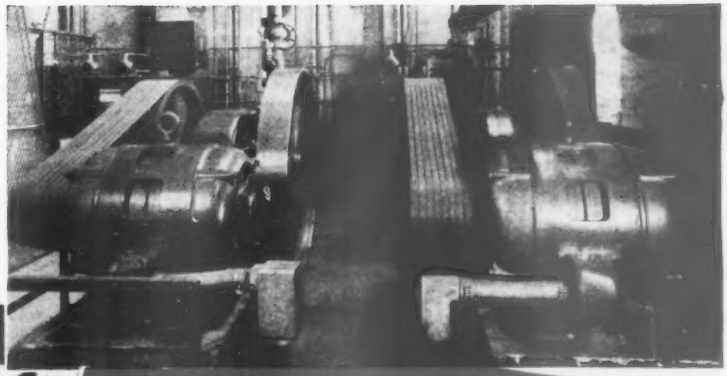
Appraising the Supervisor

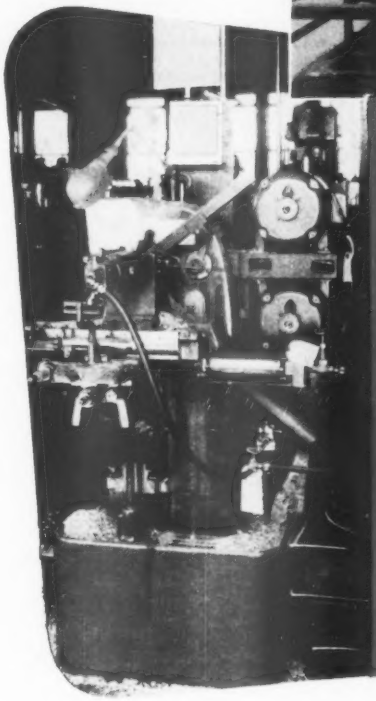
HARRY HEPNER, Department of Psychology, Syracuse University, speaking before American Management Association

The good supervisor has learned to enjoy people—he has social "savvy." He is not self-conscious because his

Two Century 100 horsepower squirrel cage motors drive air compressors which furnish air for portable tools, industrial furnaces, air lifts, air chucks, moulding machines, cleaning, etc.

Two Century 1 horsepower totally enclosed squirrel cage motors operate this automatic miller which produces 700 pieces per hour. Enclosed design protects against flying chips.





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Century motors are available in a wide range of types, in sizes from 1/6 to 400 horsepower, single phase, polyphase and direct current. Where atmospheric conditions create a hazard, Century motors are supplied with splash proof, totally enclosed fan cooled or explosion proof frames, according to the nature of the hazard.

The two illustrations are typical of the widely varying applications, where Century motors furnish dependable power.

Century motors are built to stand up under the toughest operating conditions. Rugged frames, accurate machining, large shafts, accurate alignment, good mechanical and electrical balance—all contribute to their outstanding performance.

Specify Century motors for all your electric power requirements.

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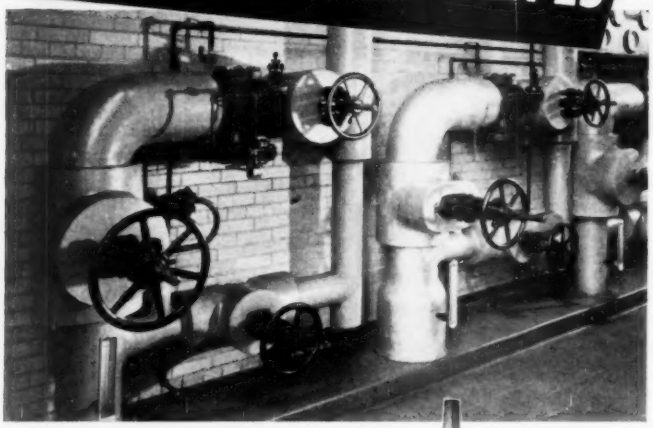


in Chicago Boiler House of United States Tobacco Co.

*"Model" tobacco, one of United States Tobacco Co.'s popular brands.

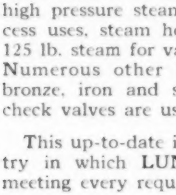
STREAMLINED in outward appearance, the power plant of United States Tobacco Company in Chicago is just as modern inside. Each item of equipment was carefully selected to provide efficient, trouble-free steam generation.

The illustration shows one of the many uses of LUNKENHEIMER VALVES in this installation . . . a pressure reducing valve station in the boiler room. Here high pressure steam is reduced for process uses, steam heating, and to obtain 125 lb. steam for various other purposes. Numerous other LUNKENHEIMER bronze, iron and steel gate, globe and check valves are used in the plant.

ARCHITECTS AND ENGINEERS: Schmidt, Garden & Erickson Chicago

CONTRACTORS: William A. Pope & Co., Inc.

This up-to-date installation is another of many throughout industry in which LUNKENHEIMER VALVES have been installed, meeting every requirement for long life and low-cost services.



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More Power to Industry through LUNKENHEIMER VALVES

thoughts are directed toward the other person rather than toward himself. He notices how people feel. If he works in an office, he notices evidence of tension or strain on the part of a fellow-employee who enters the office. Accordingly, he thinks of some tactful act to cheer up the person under strain.

His social skills with people are not expressed so as to make himself popular. If, for example, he notices that a typist under his direction shows strain or resentment when he points out errors in her work, he corrects her, using the work rather than their personal relation as the appeal.

The best prospects for supervisory responsibilities have a strong urge to do, to accomplish, to achieve, in order to be happy. They have active job interests.

The practical question for you is, how can you, as an executive, appraise a man as to whether he has a strong urge to achieve? The answer is that you do it by means of the evidence in regard to the extent to which he trains himself for his work, asks questions about the work, reads the trade journals, works overtime voluntarily, and seeks additional responsibilities.

Able supervisors identify themselves with successful people rather than with the failures of life. You can evaluate a man's identification by noting whether he visualizes himself as becoming just as successful as other successful people he knows. Does he want to join the country clubs to which successful people belong? Does he believe in a capitalistic system? Or, does he feel and claim the "have-nots" are poor because they are exploited by the "haves"?

When a man identifies himself with those who are in authority, he is willing to be guided by and counseled by his superiors. You estimate an employee in regard to the extent to which he wants to know and follow management's policies. When he disagrees with a policy, he expresses himself about it, but cooperates in putting the final policy into effect.

Good supervisors are emotionally emancipated from home ties, especially from the mother. It is usually easy to recognize the man who has an Oedipus complex, or mother fixation, because he, psychologically speaking, lives very "close" to his home. He has difficulty in falling in love, wants to look after his mother, and leans on his secretary for advice, rather than on his male colleagues in business.

Successful supervisors can make decisions and have the courage that is necessary for living their own decisions.

You can easily appraise a young supervisor as to whether he makes

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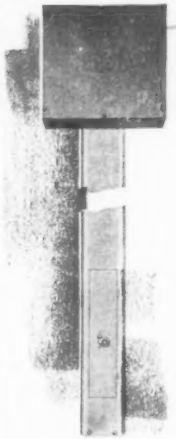


SIMPLE, compact, attractive . . . the *Pushmatic* Narrow Column Panel, featuring *Pushmatic*, offers versatility and adaptability never before obtainable in any panelboard.

You'll be surprised at the ease of installation and operation made possible by the use of simple, compact *Pushmatic* circuit-breaker units.

And it's easy to wire! Installation time is cut to a minimum. The wireman pulls the heavy main cables and branch circuit wires into place in the cabinet before the panel is mounted. He works quickly and surely because there is nothing to block his vision or cramp his movements.

There are four types of *Pushmatics:* THERMAL ONLY, THERMAL-MAGNETIC, or either of these types with AMBIENT COMPENSATING FEATURES. All *Pushmatics*, regardless of rating or type, are identical in size and contour and are interchangeable. Narrow Column Panels can be ordered with any combination of *Pushmatic* types or ratings (15 A. to 50 A. 120/240 V. AC). Underwriters' approved.

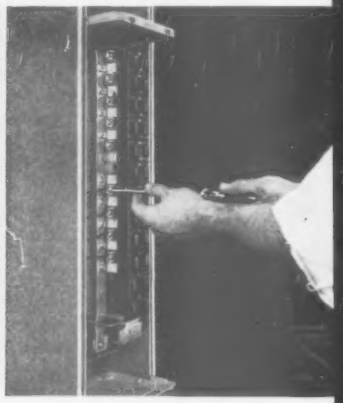
The actual installation, pictured below, could have been done just as easily and quickly in your own plant. Send the coupon today for *Pushmatic* Bulletin #493. It will answer all your questions about prices and specifications.

WIRING IS QUICKER AND EASIER WITH THE *Pushmatic* NARROW COLUMN PANEL

1 After installing the light rear halves of the cabinet and riser section, the wireman pulls the main cables down and connects them to the main lugs, easily and quickly.

2 He makes his neutral connections in the Pull Box near the ceiling, saving the conduit and wire he would have used had they been made in the panel below.

3 In plain view he brings the branch circuit wires down into the cabinet, pulls them through the holes in the wire retainer and skins them ready for connection to branch **Pushmatics.**



4 The light cabinet interior is then set in place in front of the wires and cables. Having already aligned the branch wires with the **Pushmatic** breakers through the wire retainer, he simply inserts the wires in the solderless wire grips and tightens the pressure screws.

PUSH It's ON
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Positive finger-tip control and automatic protection against short or overload are yours in the sensational, new *Pushmatic.*

Just a push of the finger makes or breaks the circuit. No resetting manually when the circuit is broken by short or overload. Just PUSH—and the electric service is restored.

Smaller than a pack of cigarettes, the *Pushmatic* is the most versatile and flexible unit available today.

Pushmatic is an individual single pole unit, eliminating complicated group mountings and making additions and changes a simple matter. And this smooth-operating unit is built for long life. Metal to plastic bearing surfaces prevent corrosion and sticking.

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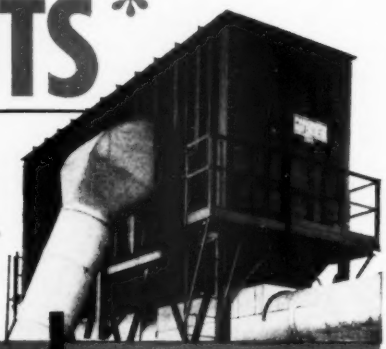

*** PROFIT $13,951**

Pangborn Dust Control eliminates dust, pays for its operation, and *earns $13,951 each year* on charcoal salvage for this manufacturer!†

*** PROFIT $12,752**

In a large grain mill, Pangborn Dust Control eliminates dust hazards and *earns a profit of $12,752* annually, salvaging grain formerly lost as dust!†

*** PROFIT $7,691**

Based on operating costs before and after Pangborn Dust Control was installed, savings, other than salvage, for this metal plant *run $7,691 a year!*†

*** PROFIT $5,103**

Asbestos salvaged to the tune of *$5,103 yearly* . . . dust completely eliminated . . . that's the Pangborn Dust Control profit story for this Asbestos manufacturer!†

† Name upon request

HOW ABOUT YOUR PLANT?

Let us make a "Dust Pocket" survey in *your plant*. There's no obligation! Pangborn engineers show you how the right Pangborn Dust Control equipment saves you money . . . boosts your profits! For full information and your *free copy* of Bulletin 909A on the control of industrial dust, write today to: PANGBORN CORPORATION, 282 Pangborn Blvd., Hagerstown, Maryland.

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STOP THE DUST HOG from stealing profits with

Pangborn DUST CONTROL

decisions and sticks to them. Does he frequently say to you: "You decide this question, chief," or, in contrast, does he say: "I'll decide the question, chief, and save you the trouble of worrying about it?"

Good supervisors have a strong sense of responsibility for their own employees, and members of their own team. You can get a good appraisal of a man by this one criterion. When a young man is asked whether he would, as a department head, prefer to be responsible for the employee relations of his own department or make the personnel department responsible, the good bet for the supervisory positions says that he wants to be responsible for his personnel.

Good supervisors and good prospective supervisors have strong personality developments in the direction of enjoying business responsibilities and in the handling of their own employees. They are willing to accept authority and guidance in the development of their own supervisory skills. They tend to be objective about their supervisory abilities—that is, they will admit their weakness in handling employees, and they are willing to improve their supervisory skills.

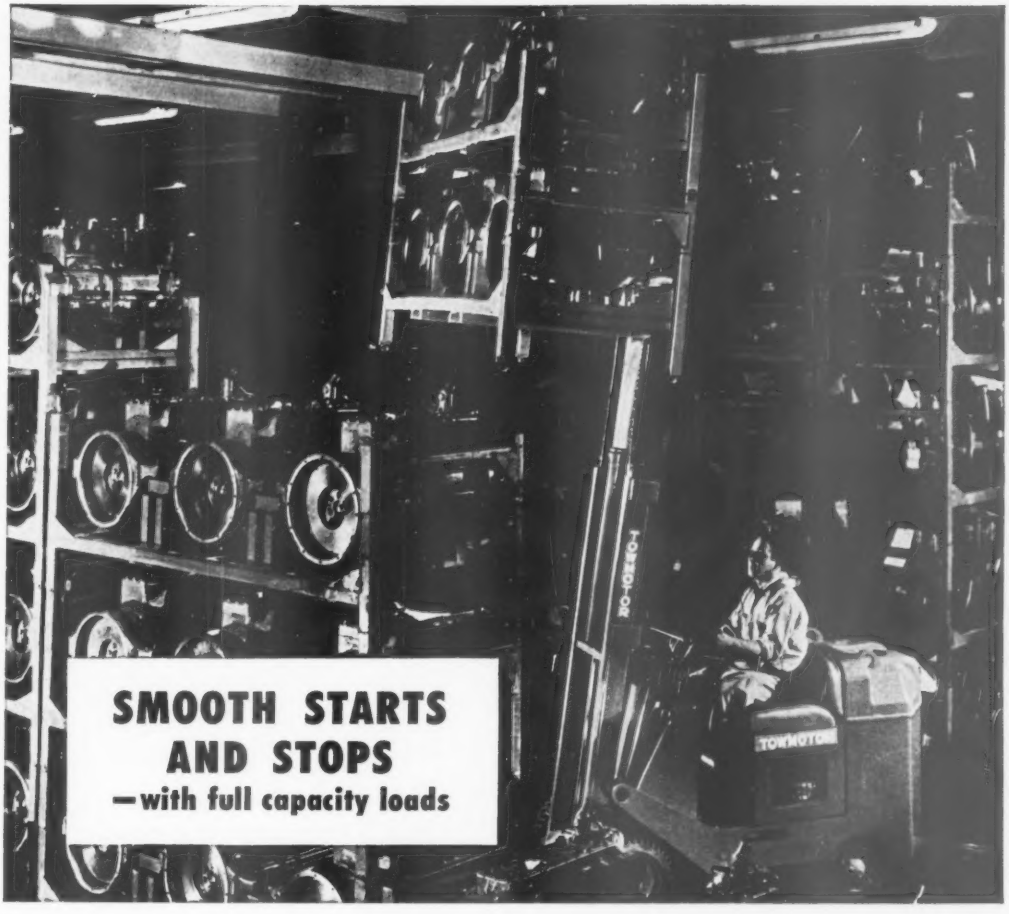
A good supervisor is even willing to let his own employees rate him on his supervisory qualities.

British Productivity Team Reports

The following is an excerpt from a digest of reports resulting from the recent visit of the United Kingdom Steel Founders Productivity Team, the first team sponsored by the Anglo-American Council on Productivity, following their visits to twenty steel foundries from March 14 to April 28, 1949.

General observations: From the technical point of view the visit was an unqualified success, although the real value cannot be assessed until the information gained has been put to practical use. If only a small portion of the vast amount of data collected is used, the effort will have been worth while. There is no radical difference between the two countries in process or approach to techical problems of the steel foundry industry, perhaps because of the interchange of technical literature and personnel. The multitude of comparatively minor elements of method or technique, when adapted to British industry, will increase productivity.

Skill appears to have an entirely different connotation in America. American management makes more efficient use of less skill. The British place more emphasis on craftsmanship. Very few American molders exercise what is understood in



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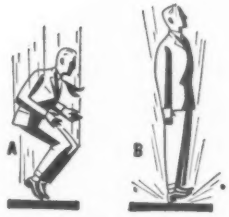

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THEY SAY AND DO (Continued)

Britain as molding skill; nearly all the real skill is moved onto the shoulders of the methods and planning engineers, with great emphasis on mechanized processes.

Plant layout, handling, servicing: The team found better handling throughout most foundries, greater use of electric trucks and other equipment; better servicing of skilled workmen; supervisors freed from detail work so they can direct efficient servicing; more carefully studied design of patterns and methods.

The flow of work is well arranged. Much good natural and artificial lighting is in evidence. Availability and accessibility of tools is more closely studied, and the trend is toward providing tools which require a minimum of manual effort for their use. Far more use is made of lifting magnets; speed of lift and travel is impressive; there is a more plentiful supply of timber for foundations and forms.

Production methods: Except in detail, foundry practice and technique are not markedly different from British methods. The use of larger heats and the manning of electric furnaces are much more economical than the British practice. However, U.S. mechanized techniques cannot be put into practice immediately in Great Britain, owing to the great shortage of power.

Attitudes: The fundamental difference of approach to a problem is the single-mindedness of the American; whether altruistic or selfish, he pursues a goal even to the point of ruthlessness. If, for instance, perfection were 100 and 25 would meet a requirement, an American manufacturer would not go much beyond 25. The United Kingdom tends more toward perfection. It would be difficult to transplant American thinking on that point, despite the fact that working toward perfection beyond specified requirements adds to labor and cost without increasing production.

Because of dependence on export markets, it would be difficult for the United Kingdom to standardize and specialize to the degree found in America. The opposite argument was brought out, however, that both countries are competing in the same world markets and buyers could not help but be influenced by presentation of alternative propositions: personal specifications versus standardized products. Simplification of standards is an endless job, but the results show up in production costs.

Labor conditions and incentives: Management and men are markedly safety conscious. Recently equipped shops give much attention to ventilation and removal of dust. There were no canteen facilities in most American foundries. Washing and changing rooms are well equipped.

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EVERLASTING FASTENINGS
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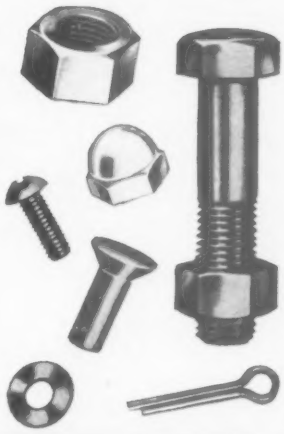

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THEY SAY AND DO *(continued)*

Sports and social clubs are not encouraged at foundries to the extent they are in Britain. The hospitalization, life insurance, and sickness benefit schemes are good. Incentives follow the lines of piecework in Britain, with the advantage that the wage earnable is directly related to the work done and is not complicated by any irrelevant calculations such as the British National Award Bonus. Cooperation of personnel toward time studies and new methods was apparent and great competition was in evidence even between personnel of different foundries.

Unemployment Statistics Not Too Black

The rise in the number of jobless has set off a lot of economic wailing-at-the-wall, but a study of the figures brings out some brighter aspects. In spite of unemployment rising from 1,716,000 in May, 1948, to 3,289,000 in May last, employment also is up—from 58,660,000 for May, 1948, to 58,-694,000 for last May.

The drop is in manufacturing, while increased employment comes from seasonal upturn in farm labor.

Another bearish factor: people out of work from 15 to 26 weeks last month totaled 486,000—but a year ago it was only 265,000. However, when you figure those as a percentage of total jobless for their respective periods, you come up with 14.8 per cent out for 15-26 weeks this year, against 15 per cent for last year.

Plant-Improvement Plan Helps Prevent Layoffs

Recently 40 men who otherwise would have been laid off from their production jobs at American Pulley Company, Philadelphia, started cleaning and repainting machinery in the plant. This was the start of a plantwide improvement program timed to keep veteran employees on the company payroll, despite a drop in production orders.

Officials of Local 155 of the United Electrical, Radio & Machine Workers (CIO) agreed to the layoff-prevention plan, which will provide an estimated 16,000 hours of work in the next few months.

The union wanted a wage increase for the company's 250 workers, but when faced with layoffs, settled for a contract which included job security in the form of this plan.

Under the plan, the men are assured of working at least four days a week at regular straight-time pay. Work will include overhauling and servicing machinery, painting, and general maintenance.

It is estimated that the plan will cost the company between $20,000 and $25,000. According to union calculations, this is equivalent to a 4- to 5-cent pay raise.

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BEHIND THE BYLINE

Facts About *Factory's* Authors

Norman J. Shibley (page 112) has been working in the automotive field since 1917 when he joined the army and was placed in charge of Motor Transport Repair Depot 387. While attending Columbia evenings he worked in the government automotive experimental and test laboratories. He has been with Thompson Products since 1929, where he is now superintendent of services. He has life memberships in the Antique Automobile Club of America, Old Timers Automovile Club, Veterans Automobile Club, and the Horseless Carriage Club of America.

Henry J. Kreutzinger (page 122) is superintendent of general maintenance in GMC's Allison Plants 1, 2, and 3. Born in Mt. Vernon, Ind., he studied at De Pauw University. Early experience includes work with several electrical manufacturing firms, electrical contracting, and supervision of powerhouse construction for Indiana Power and Light Company. He became associated with Allison in 1932. His hobby is raising horses.

Denton Swartwout (page 126), president of The Swartwout Company of Cleveland, received his B.S. in mechanical engineering from Case Institute of Technology in 1915. He went directly into the Swartwout business, which was founded by his father,

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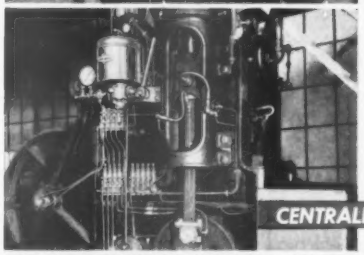

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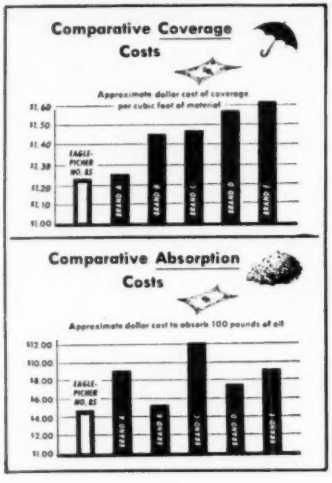

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BEHIND THE BYLINE *(continued)*

and at one time or another has held almost every position in the company.

A Behind-the-Byline sketch of R. N. Hackett (page 98) appeared in the March, 1948, issue in connection with his article "Power Trucks Expedited Through Central Control." He has served with Wagner Electric Corporation for 24 years. Beginning in the automotive screw machine department, he has held both production and administrative positions. Plant engineer for over six years, he has recently been promoted to the position of superintendent of parts and service packaging and shipping.

•

(The following were received too late for inclusion in the July issue.)

Lee Tyler ("Equipment Upkeep Plan Cuts Replacement Cost 50 Per Cent," page 90, July issue) is responsible for more than 200 pieces of rolling equipment as manager of the automotive shop for Pan American World Airways' Atlantic Division at LaGuardia Field. He has been with Pan American since 1937, following seven years' experience as beaching chief for the 42-ton flying boats then in trans-oceanic service.

A. F. Lukens ("Lubricating Ball-Bearing Motors," July, page 112) is application engineer of the Lynn Motor Sales Division of General Electric. He graduated from Princeton in 1926, received his E.E. degree in '27, and went directly to work for GE, first in testing, then in the single-phase motor department in Pittsfield. He reports his extra-curricular activities as: preferred—skiing and mountain climbing; usual — shoveling snow and mowing the lawn.

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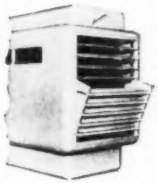
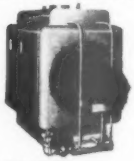


Illustration at left shows unit heater with louvers adjusted to direct the heated air downward. Heat is supplied right where needed and in the correct amounts.



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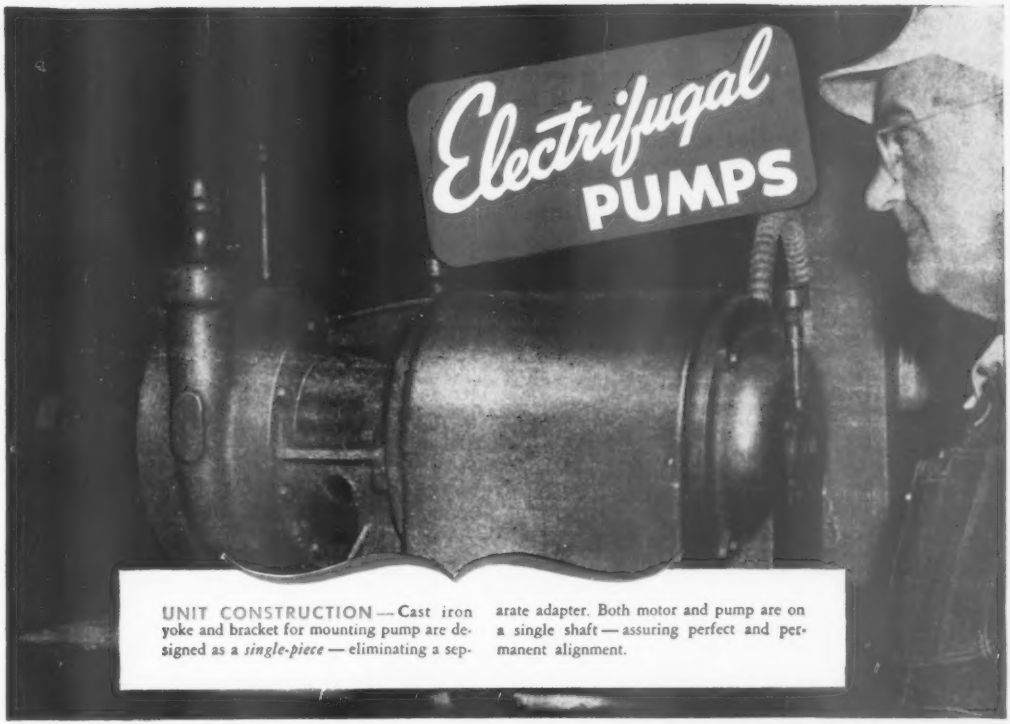

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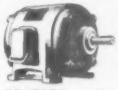

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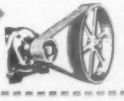

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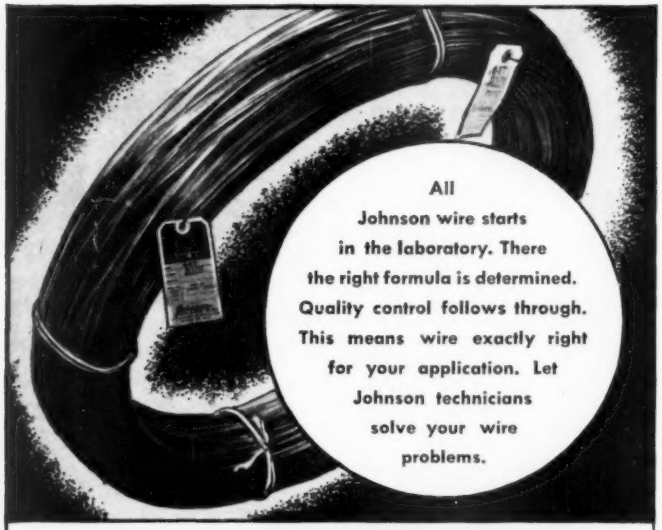

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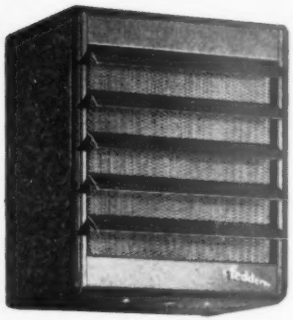

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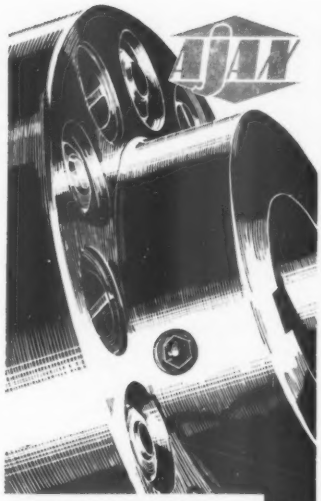

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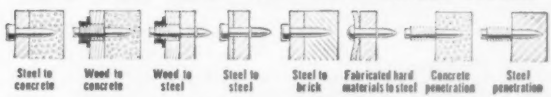

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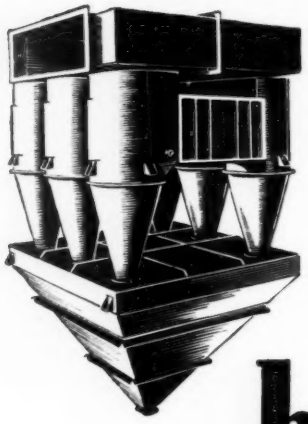

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GEORGE R. TERRY, C.E., Ph.D., Northwestern Univ. School of Commerce. Wm. C. Brown Co., 915 Main St., Dubuque, Ia. 170 pp. Tables, diagrams, layouts, sketches, charts, index. $2.50.

Business situations met in actual practice are reported here in 130 case histories depicting problems requiring managerial action. Cases have been separated into 33 major management subjects, with theoretic and general backgrounds, to serve as laboratory material with which practice may be acquired in the analyzing of everyday problems.

Cost Accounting

JAMES H. MARCH, assoc. prof. of accounting, Univ. of Wis., Milwaukee Extension Div. McGraw-Hill Book Co., 330 W. 42nd St., New York 18. 558 pp. Photographs, tables, charts, specimen forms, questions for discussion, problems, index. $5.

One of the McGraw-Hill Accounting Series. This book outlines factory cost accounting, showing it as an integral part of industrial management. Cost-control procedures are discussed, as well as product costing, cost bookkeeping, and the controllership function as distinguished from the production-management function.

Pump Engineering Data, 1949

Economy Pumps, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O. 416 pp. Photographs, tables, diagrams, sketches, engineering data index, alphabetical index. $2.

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Modern Plastics Encyclopedia

Plastics Catalogue Corp., Breskin Publications, 122 E. 42nd St., New York 17. 1372 pp. Photographs, sketches, tables, charts, buyers' guide, alphabetical index of manufacturers, index of products, glossary. $5.

Called a "working guide to all phases of plastic planning and production," this volume reports technical advances made in the plastics industry during the past year. 200-page section, "Plastics in Use," analyses more than 1000 successful applications in 27 basic industrial fields.

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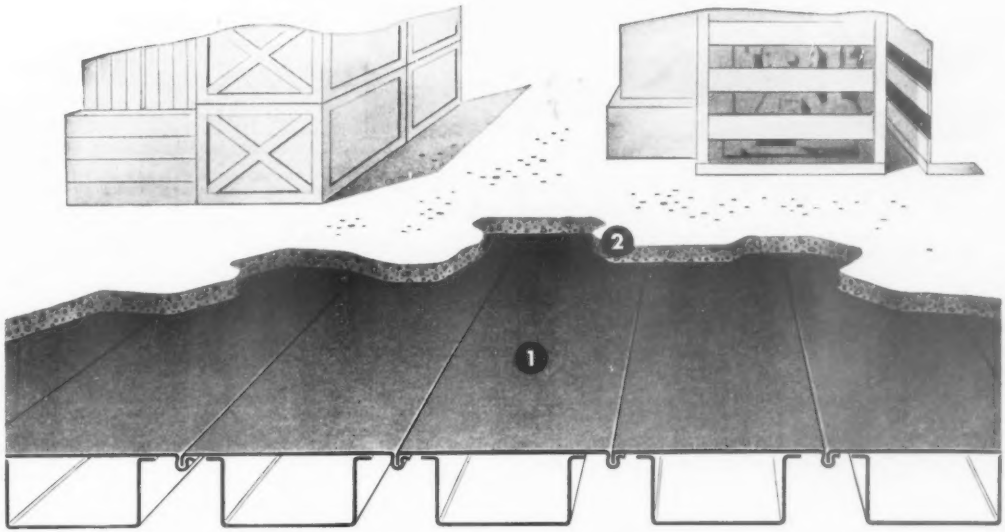

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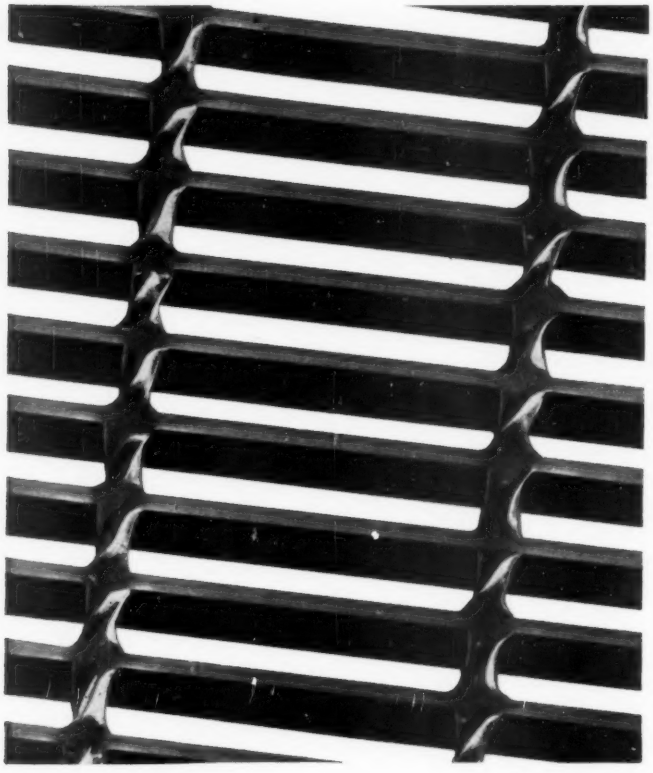

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of the Federal government from the point of view of everyday usefulness to the average businessman. How to use the government agencies, how to sell to the government, and other topics are included.

Conveyors and Related Equipment

WILBUR G. HUDSON. John Wiley & Sons, Inc., 440 4th Ave., New York 16. 2nd ed. 468 pp. Photographs, tables, sketches, diagrams, charts, appendixes 1 and 2, index. $7.

The science of handling materials is discussed in this volume. The author describes all types of conveyors, elevators, hoists, tramways, and other equipment for movement of materials and equipment. Included in this edition is information on pneumatic conveyors, dust explosion hazards, and recent technical improvements.

Maintenance Manual of Electronic Control

ROBERT E. MILLER, Weller Mfg. Co., formerly industrial editor, "Electrical Construction and Maintenance." McGraw-Hill Book Co., 330 W. 42nd St., New York 18. 304 pp. Photographs, sketches, tables, charts, diagrams. $4.50.

Written for the electrical and electronic technician, this book is a manual of installation, maintenance, and service practices. It ranges from simple electrical circuits through those of electronic motor controls and welding controls. Maintenance and adaptation of tools and instruments, various types of equipment, also are covered.

Profit Sharing Manual

Council of Profit Sharing Industries, 15 E. 16th Ave., Columbus 1, O. 647 pp. Photographs, sketches, charts, tables, specimen forms. $10.50.

"A digest and analysis of 84 representative profit sharing plans." The members of the Council of Profit Sharing Industries feel that since they have found profit sharing produces lower costs, higher wages, and higher profits, as well as promoting good worker-management relations, their plans should be made available to others so that all may benefit. The book also includes the declaration of principles and constitution of the group, together with a discussion of the philosophy, economics, and methods of profit sharing.

Job Evaluation

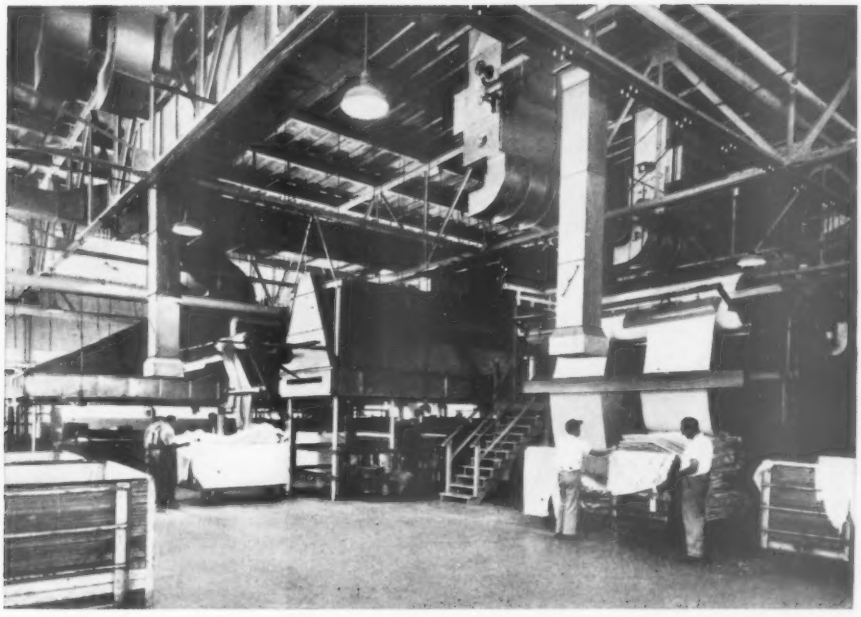
JOHN A. PATTON, president, and **REYNOLDS S. SMITH, Jr.,** management consultant, both of John A. Patton Management Engineers, Inc. Richard D. Irwin, Inc., Chicago. 316 Sketches, specimen forms, graphs, bibliography, index. $4.50.

Emphasizing the practical aspects of job evalution, the authors have reported on their experiences in installing job evaluation systems in various types of companies. They describe both management and labor techniques by which problems of wage rate determination can be solved with a reasonable degree of accuracy.

Management of Industrial Enterprises

RICHARD N. OWENS, Ph.D., C.P.A., prof. of accounting and business admin., George Washington Univ. Richard D. Irwin, Inc., Chicago. 650 pp. Photographs, sketches, charts, tables, specimen forms, index. $6.

An analysis of typical problems which confront the manager of various departments of industrial and business enterprises, showing the interrelationship of the various activities. Starting with the evolution of management, the



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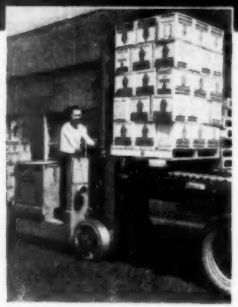

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UNIFIED AND AMERICAN SCREW THREADS for screws, bolts, nuts, and other threaded parts. Sponsored by the Society of Automotive Engineers and the American Society of Mechanical Engineers. The American Society of Mechanical Engineers, 29 W. 39th St., New York 18. 39 pp. Tables, drawings, appendixes A through H. $3.

EFFECTIVE COMMUNICATION IN INDUSTRY. Paul Pigors, assoc. prof. of industrial relations, dept. of economics and social science, Mass. Institute of Technology. Lt. Rush Toland Memorial Study No. 1. National Assn. of Manufacturers, 14 W. 49th St., New York 20. 88 pp. Bibliography, index. No charge.

PROCEEDINGS OF THE CONFERENCE ON INDUSTRY-WIDE COLLECTIVE BARGAINING. Industry - Wide Collective Bargaining Series. Labor Relations Council, Wharton School of Finance and Commerce, Univ. of Pa. Univ. of Pa. Press, 3436 Walnut St., Philadelphia 4. 87 pp. $1.50.

INDUSTRIAL TRAINING—A GUIDE TO SELECTED READINGS. John M. Brophy and I. Bradford Shaw. Ext. Bul. No. 1. N. Y. State School of Industry and Labor Relations, Cornell Univ., Ithaca, N. Y. 32 pp. Bibliographies, author index. No charge for single copies to New York residents; bulk and out-of-state orders, 10¢ each.

TUBERCULOSIS IN INDUSTRY. A panel discussion of the medical conference held in connection with the 13th annual meeting of Industrial Hygiene Foundation. Medical Series, Bul. No. IX. Industrial Hygiene Foundation, 4400 5th Ave., Pittsburgh 13. 29 pp. 50¢.

AMERICAN MANAGEMENT TECHNIQUES AND PRACTICES AND THEIR BEARING ON PRODUCTIVITY IN BRITISH INDUSTRY. A survey by A. P. Young, O.B.E., Chairman, Institution of Works Managers, Ltd. Inst. of Works Managers, Ltd., 67-9 Chandos Pl., London WC2. 70 pp. Tables. No charge to members, 2/6 to nonmembers.

ADVANCES IN INSURANCE COVERAGE: Accident Prevention and Control. Insurance Series No. 78. American Management Assn., 330 W. 42nd St., New York 18. 39 pp. 75¢.

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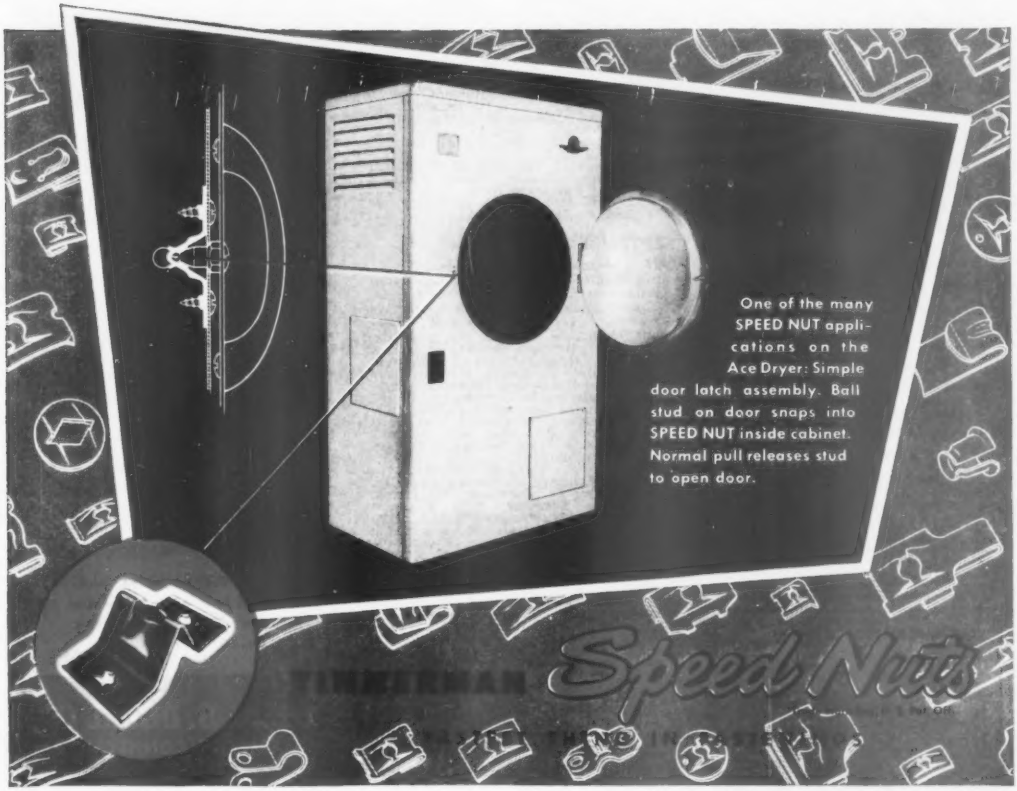
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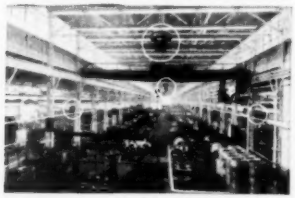

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relations research. Production Series No. 187. American Management Assn., 330 W. 42nd St., New York 18. 71 pp. $1.25.

INDUSTRIAL OPPORTUNITIES ON SOUTHERN ILLINOIS CRAB ORCHARD LAKE. Div. of Information, Fish & Wildlife Service, U. S. Dept. of the Interior, Washington, D. C. 9 pp. Photographs. No charge.

A REVIEW OF WAGE-INCENTIVE PRACTICE. Industrial Welfare Div., Dept. of Labour and National Service, Commonwealth of Australia, Melbourne. 32 pp. List of references. Complimentary.

CATHODIC PROTECTION OF GALVANIZED HOT WATER STORAGE TANKS by use of galvanic magnesium alloy anodes. D. J. Fergus, research engineer. Educational Bul. No. EB-104. The Cleveland Heater Co., 2301 Superior Ave., Cleveland 14. 16 pp. Photographs, diagrams, tables, charts. 25¢.

BLUEPRINT FOR TOMORROW. Designed to interpret 15 management techniques involved in planning a sound business and industrial future. John P. Cleaver, production consultant, Worcester Chamber of Commerce, Commonwealth Press, Worcester 8, Mass. 44 pp. Single copies, $1; lower prices for quantity orders.

ON THE CALENDAR

AUGUST

9-12, 2nd Annual Western Packaging Exposition; San Francisco Civic Auditorium. Kenneth K. Dean, General Chairman, 759 Monadnock Bldg., San Francisco 5.

22-26, National Association of Power Engineers, Inc., 48th National Power Show and Convention; Hotel Sherman, Chicago. John C. Toohy, Exhibit Manager, 176 W. Adams St., Chicago 3.

23-26, American Institute of Electrical Engineers, Pacific Coast General Meeting; Fairmont Hotel, San Francisco. H. H. Henline, Secretary, 29 W. 39th St., New York 18.

SEPTEMBER

9-12, The Instrument Society of America, Clinic on Maintenance of Industrial Instruments; Statler Hotel, St. Louis. Richard Rimbach, Executive Secretary, 1117 Wolfendale St., Pittsburgh 12.

12-16, The Instrument Society of America, 4th National Exhibit; Municipal Auditorium, St. Louis, Mo. Richard Rimbach, Executive Secretary, 1117 Wolfendale St., Pittsburgh 12.

12-16, National Recreation Association, 31st National Recreation Congress; Municipal Auditorium, New Orleans. Thomas E. Rivers, Secretary, 315 4th Ave., New York 10.

14-16, Porcelain Enamel Institute, 11th Annual Forum; Ohio State University, Columbus, O. Edward Mackasek, Managing Director, 1010 Vermont Ave. N. W., Washington 5, D. C.

18-23, American Chemical Society, 116th National Meeting; Hotel Thompson, Atlantic City, N. J. Alden H. Emery, Executive Secretary, 1155 16th St. N. W., Washington 6, D. C.

19-23, Illuminating Engineering Society, National Technical Conference; French Lick Springs Hotel, French Lick, Ind. A. D. Hinckley, Executive Secretary, 51 Madison Ave., New York.

21-23, The National Association of Foremen, 26th Annual Convention; Statler Hotel, Detroit. J. E. Bathurst, 321 W. 1st St., Dayton 2.

26-28, American Management Association, Personnel Conference; Waldorf Astoria, New York. E. O. Malott, Division Manager, 330 W. 42nd St., New York 18.

28-30, American Society of Mechanical Engineers, Fall Meeting; Lawrence Hotel, Erie, Pa. Ernest Hartford, Ex-

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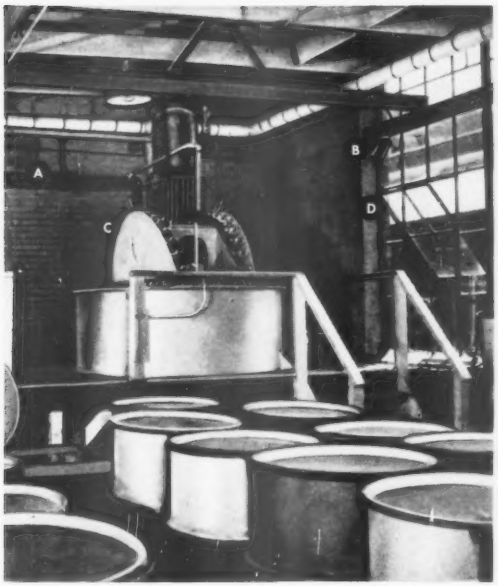

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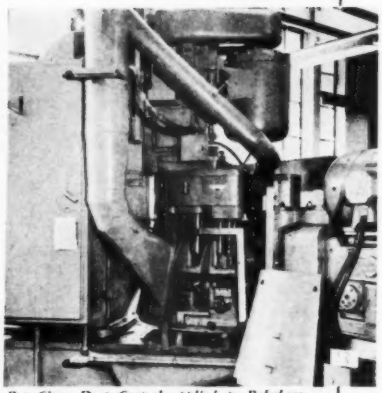

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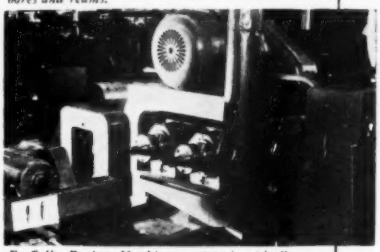

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ecutive Assistant Secretary, 29 W 39th St., New York 18.

OCTOBER

2-7, Packaging and Materials Handling Institute; Wayne University, School of Business Administration. Dr. Spencer A. Larsen, Chairman, Wayne University, Detroit.

3-5, National Lubricating Grease Institute, Annual Meeting; Hotel Roosevelt, New Orleans. Harry F. Bennetts, Executive Secretary, 4638 Mill Creek Pkwy., Kansas City 2, Mo.

3-6, Association of Iron and Steel Engineers, Annual Convention; Hotel William Penn, Pittsburgh. T. J. Ess, Managing Director, Empire Bldg., Pittsburgh.

4-7, Society of Industrial Packaging and Materials Handling Engineers, 4th Annual Industrial Packaging and Materials Handling Exposition; Convention Hall, Detroit. C. J. Carney, Jr., Managing Director, 20 W. Jackson Blvd., Chicago 4.

10-14, American Society for Testing Materials, 1st National West Coast Meeting; Fairmont Hotel, San Francisco. Robert J. Painter, Assistant Secretary, 1916 Race St., Philadelphia 3.

11-14, American Standards Association, Annual Meeting; Waldorf Astoria, New York. Vice Adm. George F. Hussey, Jr., USNR, Secretary, 70 E. 45th St., New York 17.

17-21, American Institute of Mining Engineers, Fall Meeting, Metals Branch; Public Auditorium, Cleveland. E. J. Kennedy, Jr., Assistant Secretary, 29 W. 39th St., New York 18.

17-21, American Society for Metals, 31st Annual Meeting; Public Auditorium, Cleveland. W. H. Eisenman, Secretary, 7301 Euclid Ave., Cleveland 3.

17-21, American Welding Society, Annual Meeting; Public Auditorium, Cleveland. M. M. Kelly, Secretary, 33 W. 39th St., New York 18.

17-21, Society for Non-Destructive Testing, Annual Meeting; Public Auditorium, Cleveland. Walter Morrison, 7301 Euclid Ave., Cleveland 3.

17-23, American Institute of Electrical Engineers, Fall General Meeting; Netherlands Plaza Hotel, Cincinnati. H. H. Henline, Secretary, 29 W. 39th St., New York 18.

17-Dec. 9, Management Problems for Executives, 3rd Session; University of Pittsburgh. E. C. Stone, Coordinator, School of Business Administration, University of Pittsburgh, Pittsburgh 13.

18-19, California Personnel Management Association, 22nd Pacific Coast Management Conference; Claremont Hotel, Berkeley, Calif. A. B. Tichenor, President, 442 Flood Bldg., San Francisco 2.

24-26, Packaging Institute, 11th Annual Forum; Hotel Commodore, New York. Dr. L. V. Burton, Executive Director, 342 Madison Ave., New York 17.

24-28, National Safety Council, 37th National Safety Congress and Exposition; Stevens, Congress, and Morrison Hotels, Chicago. R. L. Forney, General Secretary, 20 N. Wacker Dr., Chicago 6.

26-27, National Conference on Industrial Hydraulics, 5th Annual Convention; Sheraton Hotel, Chicago. Otto J. Maha, Conference Director, Hannifin Corp., Chicago.

26-28, National Metal Trades Association, Annual Convention; Palmer House, Chicago. Homer D. Sayre, Commissioner, 122 S. Michigan Ave., Chicago 3.

31-Nov. 2, Packaging Machinery Manufacturers' Institute, 17th Annual Meeting; Edgewater Beach Hotel, Chicago. H. L. Stratton, 342 Madison Ave., New York.

31-Nov. 3, American Institute of Accountants, Annual Meeting; Biltmore Hotel, Los Angeles. John Carey, Executive Director, 13 E. 41st St., New York.

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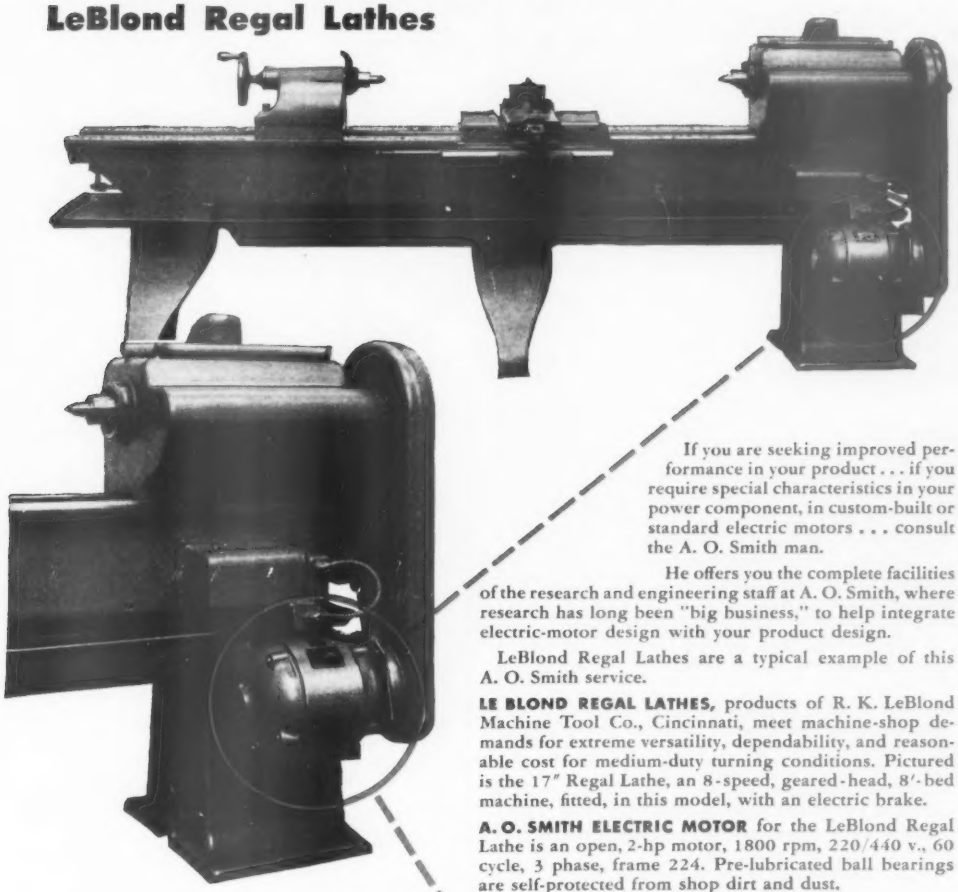

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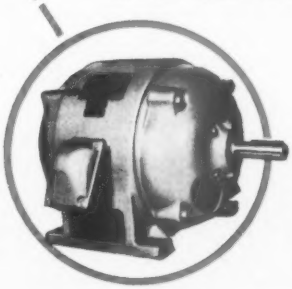

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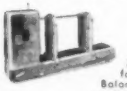

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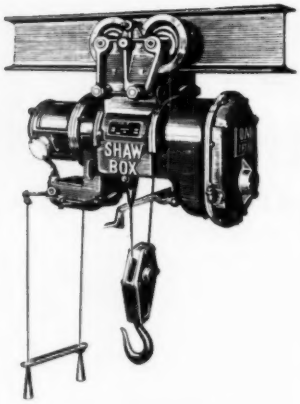

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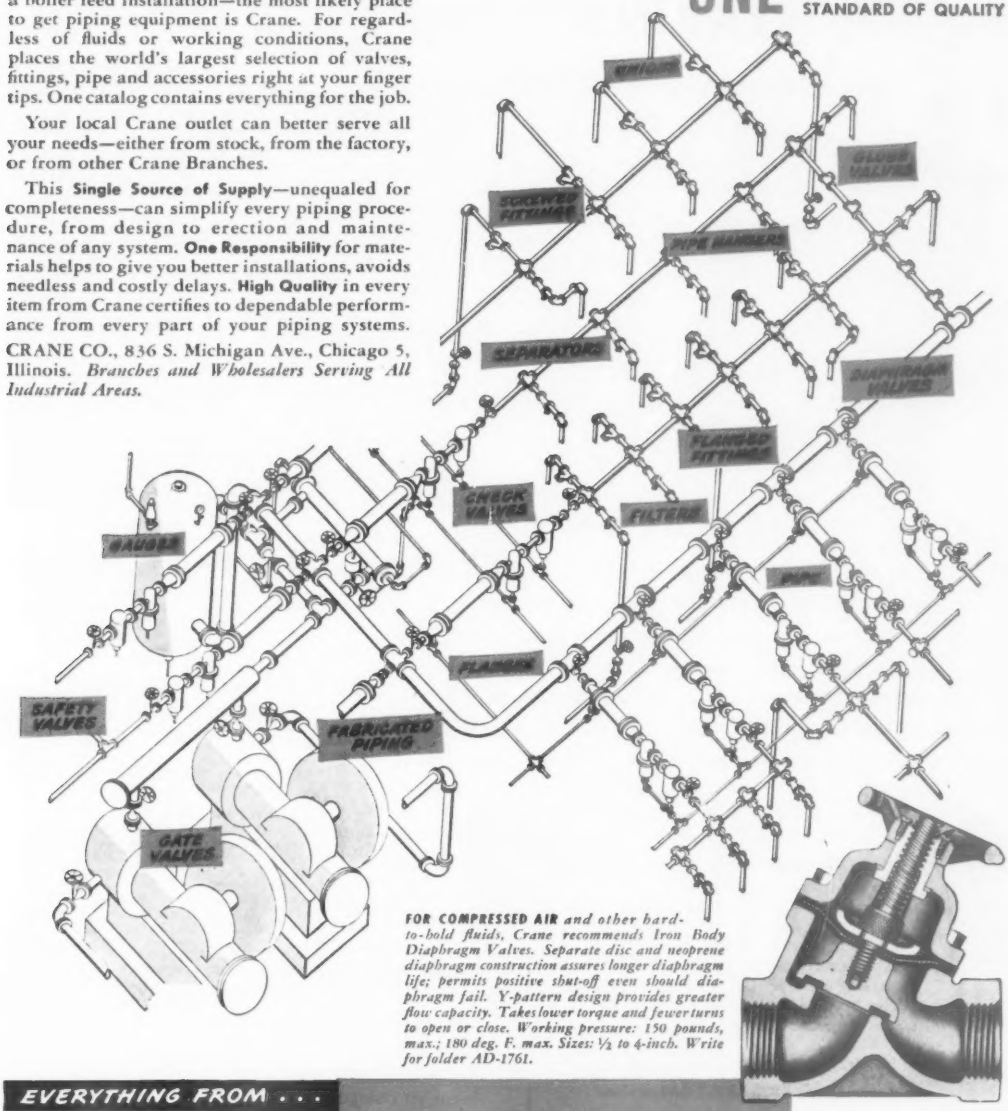

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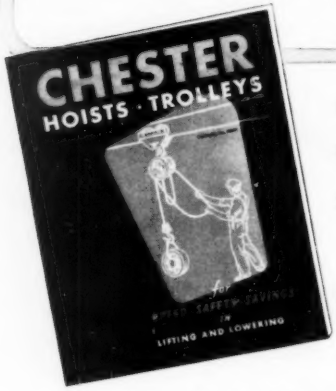

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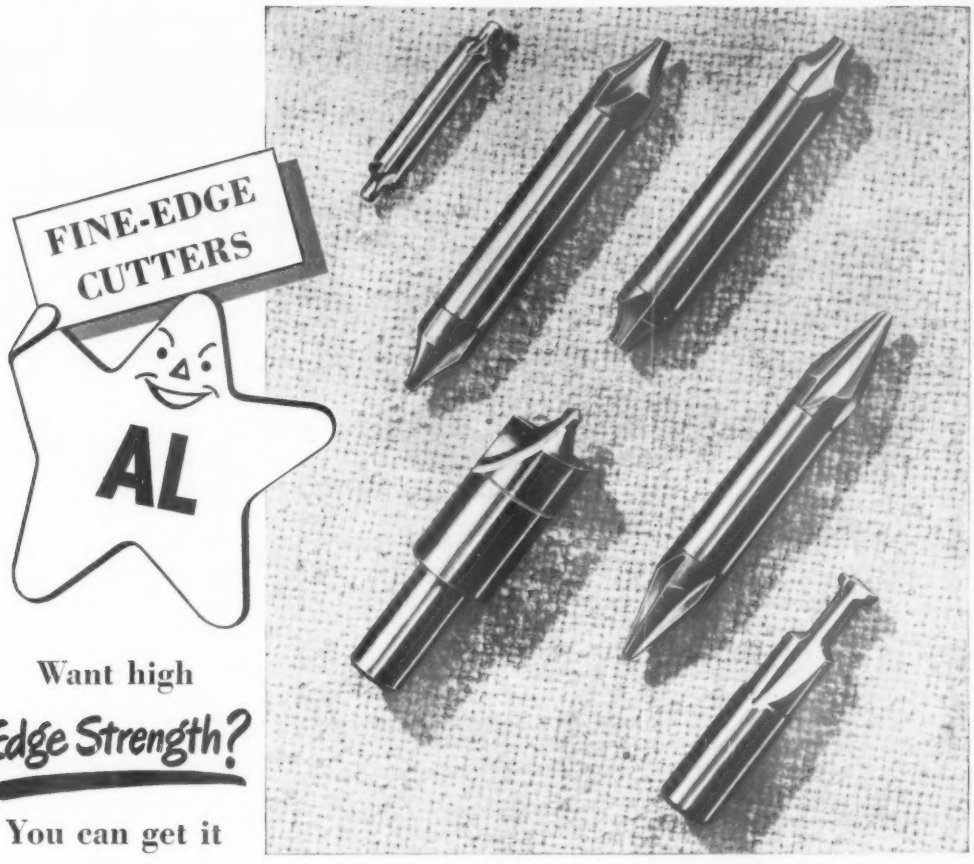
HELMET — for sand, grit blasting, called Purair. Description, construction, instructions for use. Photographs, installation diagram. The W. W. Sly Mfg. Co.

—58—

HOSE, FIRE—Methods of construction, materials used. Sizes, couplings and test pressures, weights, photographs of



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each type, accessories. Bul. 3740, 6 pp. The B. F. Goodrich Co.

—59—

INSTRUMENT—"Multi-Switch" capacitrol indicating pyrometer controller with "distant view scale," for measuring and indicating process variables. How it works, features, specifications, technical data. Bul. MC-1, 2 pp. Wheelco Instruments Co.

—60—

INSTRUMENTS—60(a) Bul. 427, 32 pp.; Dynalog instruments for process measurement, recording control, with auxiliary devices for adapting to varying applications. 60(b) Bul. 430, 16 pp.; equipment for measurement and control of pH in processing operations. Explanation of the pH value, its effects, case histories. Both bulletins describe the various instruments, explain operation of each with photographs, dimensional drawings, charts, installation data on different types. The Foxboro Co.

—61—

INSTRUMENTS — 61(a) Indicating gages, called Superbronze Non-Corrosive. Construction data, specifications, photographs. 61(b) Combination Dead-Weight Gage Tester Ranges, construction, features of different models, operating instructions. Cross-sectional diagram. Star Brass Div., Williams & Hussey Machine Co.

—62—

INSULATION, ELECTRICAL — 62(a) "Manual and Catalog of Fiberglas Glass-base Electrical Insulating Materials." Description, characteristics, properties of different types, photographs of installations. 38 pp. 62(b) Sources of supply; list of manufacturers, weavers and braiders, distributors, branch offices. Owens-Corning Fiberglas Corp., Textile Products Div.

—63—

INSULATION, MAGNESIA — 96-page book, "85% Magnesia Insulation Manual"; properties, determination of correct thicknesses, application and finishing procedures, maintenance data. Photographs, line drawings, piping diagrams; appendix of informative tables, index. The Magnesia Insulation Manufacturers' Assn.

—64—

JOINTS, CORRUGATED EXPANSION—"Design Guide," CMH-104, 28 pp. Selection factors, for determining correct types. Anchoring methods, installation data. Construction features, tables of thermal expansion, saturated steam, specifications. Photographs, drawings, charts. Chicago Metal Hose Corp.

—65—

LADDERS, SAFETY STEP—on rolling casters with rubbertipped locking device. Photographs, descriptions of different models, accessories. The Ballymore Co.

—66—

LAMP CHANGER, FLUORESCENT — and safety clips. Photographs, sketches show construction, how to use, different models; prices, weights. Newman Mfg. Co.

—67—

MALLETS—rubber, composition. Uses, characteristics, description, sizes of different types. Photographs. Industrial Products Co.

—68—

MATERIALS HANDLING CASE HISTORIES—68(a) Job Study 87, Railroads transferring freight to and from cars warehouse, lighters, ships. 68(b) Job Study 88, Radio parts; transporting raw materials from truck to warehouse to assembly lines, storage. Towmotor Corp.

—69—

MATERIALS HANDLING DUMP BOX—portable. Capacity, construction, uses. Photographs. Equipment Mfg., Inc.

—70—

MATERIALS HANDLING EQUIPMENT—"Time Savers," 4-page Bul. 4881; lift trucks, elevators, storage racks, pallets, dollies, skids. Photographs, descriptions, capacities. Barrett-Cravens Co.

—71—

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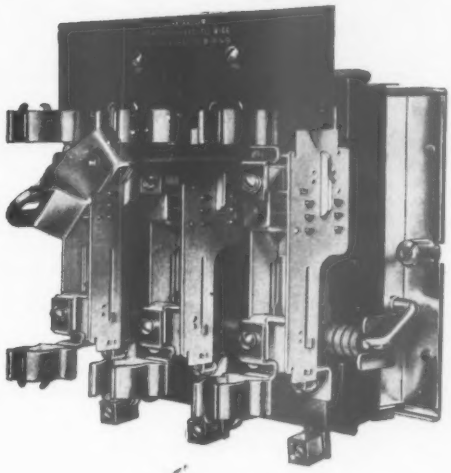

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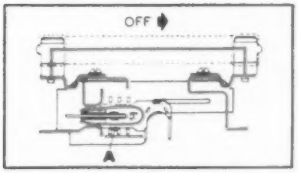
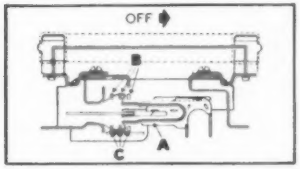
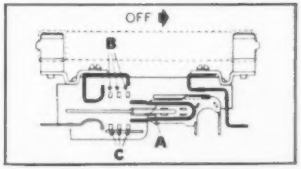


1. Switch closed. Spring-loaded sliding contact (A) fully inserted between stationary contacts. Red indicates current.



2. Sliding contact being withdrawn. The two arcs repel each other, are drawn against grid pins (B) and (C), which break and cool them.



3. Contact fully withdrawn. Trumbull's unique "Circuit-Breaker" action has effectively extinguished the arcs.

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Front fusing allows compact box, yet gives ample wiring space.

No exposed live parts when switch is OFF and door is open.

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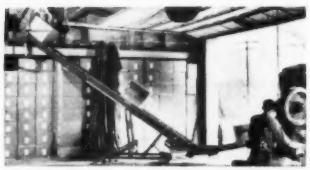

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Cat. No. 500, 24 pp. How to frame, hang, support, mount equipment in electrical, plumbing, heating, ventilating, air conditioning, piping work. Photographs, sketches, specifications. Unistrut Products Co.

—72—

METAL GRATING—Description, photographs of different types. Tables of safe loads, general engineering data, anti-slip stair tread data. Sketches show different types of construction. Weldforged Grating Div., Kerrigan Iron Wks., Inc.

—73—

METAL POWDER COMPOSITION — called Fastell, for use as electrical contacts. Characteristics, physical properties of different grades, mechanical and design features. Photographs, drawings; typical applications. Tech. Data Bul. 7.101, 12 pp. Fansteel Metallurgical Corp.

—74—

METAL PROCESSING FACILITIES — "For Your Contract Requirements of Metal Products and Components," 4-page outline of fabricating and finishing service. Designing, engineering, stamping, drawing, forming, welding, tinning, galvanizing, coating, painting, other facilities. Geuder, Paeschke & Frey Co.

—75—

METER, AIR—to determine air velocity, temperature, static pressure. Bul. 25A, 4 pp. Operating principles, applications; photographs. Anemostat Corp. of America.

—76—

METERS—called Shuntflow. 76(a) Bul. 400-F1, Model SMKS, for measurement of steam, air, gas flow in lines from 1- to 12-in. diameter. 76(b) Bul. 400-F2, Model SMDH, for steam, air, gas flow in 1- or 1½-in. pipe lines. Features, description, operation, capacities, installation data, sizes, specifications, accessories given for each type, as well as photographs, diagrams, saturated steam tables, correction factor charges. Builders-Providence, Inc.

—77—

MOTOR—called Safety-Circle. Design, construction features, models available; capacities; dimensions, specifications. Bul. 51B6210B, 8 pp. Photographs, dimensional diagram, cutaway view. Allis Chalmers Mfg. Co.

—78—

MOTOR DRIVE—regulated single, for paper machines. Bul. B-2279-B, 8 pp. Construction, features, speed range and regulation. Guide for estimating power requirements and speed ratio guide. Westinghouse Electric Corp.

—79—

MOTORS—"Wound Rotor Machines, Slip Ring Motors," Bul. SR-1, 4 pp. Description, special applications, performance characteristics of different types. Photographs. Table of specifications, dimensions. Howell Electric Motors Co.

—80—

MOTORS, LARGE INDUCTION — "The ABC of Large Induction Motors," Bul. 200-SYN-28, 32 pp. Basic theory, operation, characteristics and applications, control. Photographs, cutaway views, graphs, tables. Electric Machinery Mfg. Co.

—81—

MOUNTING MATERIAL—called Elasto-Rib, of cork and rubber, requiring no bolting, cementing. For controlling vibration, noise. Cat. ER-701. Description, applications, properties; installation data, diagrams; photographs. Korfund Co., Inc.

—82—

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—83—

OILERS, VISUAL—constant level; gravity drip, sight feed; multiple feed; wick feed; vibrating rod; others. Uses, ca-

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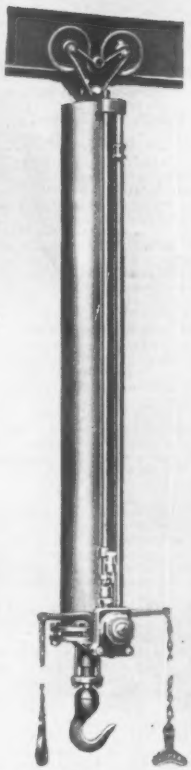

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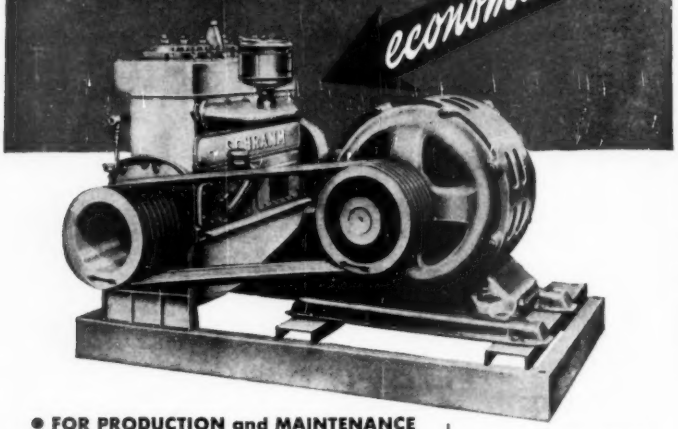

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—86—

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—88—

PANELS, PUSHBUTTON CONTROL — for automatic protection of electric circuits. 88(a) Bul. 493, 24 pp; Pushmatic Electri-Centers for "On" and "Off" switching. What it is, how it works, interchangeability; capacities, different types. Photographs, diagrams, sketches. 88(b) Bul. 494, 4 pp. General information on Pushmatic Electri-Centers, features, construction, specifications, prices. BullDog Electric Products Co.

—89—

PIPING, UNIT FABRICATION — of welded headers, assemblies, valve groupings into one-piece units. Advantages, economies; plant facilities; typical unit fabrications analyzed. Photographs, diagrams. Crane Co.

—90—

PLUGS, RECEPTACLES, CORD CONNECTORS—automatic locking, called Midget Ever-Lok. Capacities, description, photographs of each type. Russell & Stoll Co., Inc.

—91—

POWER SWEEPERS—chart comparing cost of manual versus power sweeping. Wilshire Power Sweeper Co.

—92—

PUMPS—self-priming centrifugal. 92(a) Bul. 3300-A, 4 pp; six stationary models, one portable. Range of capacities, performance tables, construction data; photographs; diagram. 92(b) Fig. 3304, portable type. Description, capacity, performance table, photograph. The Deming Co.

—93—

PUMPS—self-priming centrifugal, four types, electric-motor powered, photographs of installations, tables of friction loss, dynamic suction lifts. Also diaphragm and plunger pumps. Photographs, cutaway views. Marlow Pumps.

—94—

PUMPS—94(a) Self-priming centrifugal pumps, all steel. Sizes, mounting, specifications, pumping data. Bul. W-395-B1, 4 pp. 94(b) Vertical turbine pumps, type Q, sizes 6 to 14 inch; oil lubricated. Bul. H-450-B35, Multi-colored sectional drawing showing construction, flow diagram, design features. Photographs of different types. Sizes, capacities. 94(c) Compressors and dry vacuum pumps, air cooled. Bul. H-620-B30, 16 pp. Suggestions on compressor selection, sizes, ratings, capacities. Worthington Pump & Machinery Corp.

—95—

PUMPS, CENTRIFUGAL — "Handbook For Care of Centrifugal Pumps," 08x6256A, 16 pp. How to figure head, friction loss tables; discussion of cavitation, water as lubricant, errors in packing stuffing boxes. Sketches. Allis-Chalmers Mfg. Co.

—96—

PUMPS, TURBINE—for water transfer. Structure, applications, operating principles of each type. Sectional drawings, photographs. 96(a) Bul. 1014 features water-lubricated models, 96(b) Bul. 1013, oil-lubricated. Johnston Pump Co.

—97—

RECEPTACLES, WASTE—of Fiberok,

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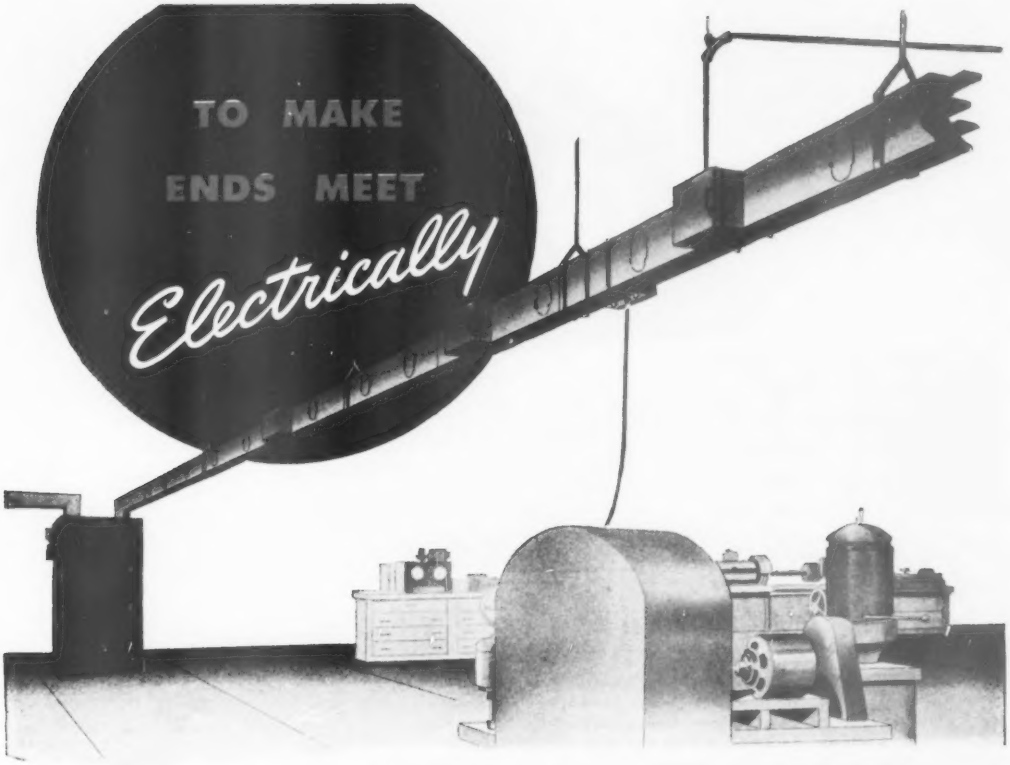

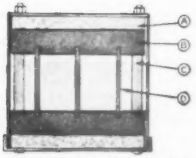

(A) Steel supporting channel; (B) Rugged porcelain insulators; (C) Fibre insulator spacers; (D) Copper bus bar conductors.

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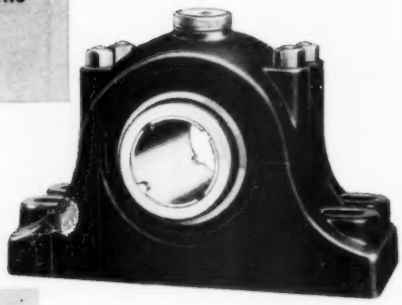

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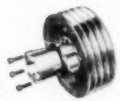

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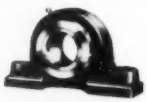

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Sizes, capacities, colors, of different types. Illustrations. Federal Fibre Corp.

—98—

RECORD CABINET—called Robot Kardex. Folder contains bulletin describing features, instructions, photographs of equipment. Remington Rand, Inc.

—99—

RECTIFYING UNIT—called Rectifilter. Features, construction, uses, installation data. Photographs, diagrams, schematic drawings, specifications. Raytheon Mfg. Co.

—100—

ROOFING, ALUMINUM—"How to Apply Kaiser Aluminum Roofing," 6-page folder. Sketches, text explains installation procedure; different types described. Permanente Products Co.

—101—

ROOFING, FASTENING METHODS—101(a) Six types of roofs, descriptions, diagrams, structural data on each; photographs of examples. 101(b) "Top-Speed" fastening method for roofing, siding. Sketches, photographs. H. H. Robertson Co.

—102—

RUST PREVENTIVE—called Totrust. How to use, where; color card; sketches. The Wilbur & Williams Co.

—103—

SAFETY PRODUCTS—and protective equipment; goggles, spectacles, helmets, face-shields, lenses, plates, other items. Applications, construction details. American Industrial Safety Equipment Co., Div. of The Burdett Oxygen Co.

—104—

SAWS, MASONRY—104(a) Model F, dry cutting. 104(b) Model WF, wet cutting. 104(c) Dust-Free model. All three bulletins outline structural features, operating principles, illustrate the models described. Martin Fireproofing Corp.

—105—

SCALE—for cranes, chain hoists. Called Hydroscale. Photographs, description, uses, capacities of different types. Hydroway Scales, Inc.

—106—

SCREWS, SOCKET—Price list booklet No. 49, 24 pp., on line of standard and special sizes of cold-forged socket screws. Features, types of thread, specifications; materials used in different styles. Photographs, diagrams. The Holo-Krome Screw Corp.

—107—

SEPARATORS, MAGNETIC—nonelectric and electronic metal detectors. Weights, sizes, strength comparisons, operating capacities; photographs, drawings of different types. Cat. 14, 12 pp. Eriez Mfg. Co.

—108—

SHIELDS; FACE, EYE—collapsible, noncollapsible; plastic, plastic and fiber; goggle or full-face types with light-diffusing visor. Called Big 6. Descriptions, photographs of different models. Byrne Industrial Services.

—109—

SMOKE ABATEMENT SYSTEM—using PliOjet over-fire air system. Operating principle, characteristics, components. Photographs, specifications of 10 types; control equipment. Plibrico Jointless Firebrick Co.

—110—

SPEED DRIVE, VARIABLE A.C.—Bul. 611-B, 20 pp., for calenders, presses, slitters, conveyors, other machines requiring constant torque input. Speed ranges, construction, features. Wiring diagrams, photographs, applications. The Louis Allis Co.

—111—

SPRAYING UNIT—called Spraymaster Model SM-25. Photograph, description, specifications. Portable Electric Tools, Inc.

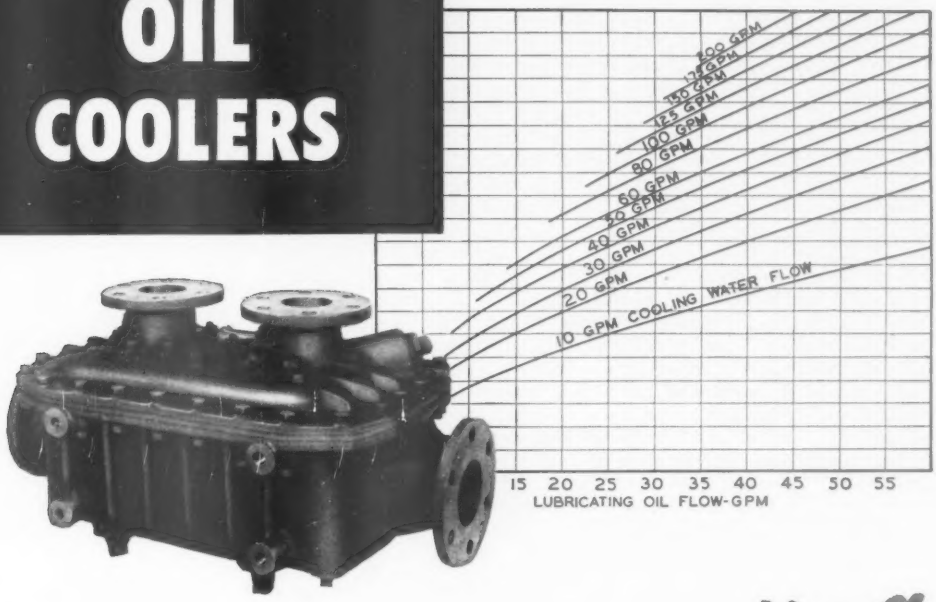
—112—

SWITCH, LIMIT—heavy-duty, called 1ML1. Description, adjustable features, ratings, mounting and circuit arrangements. Photograph, diagrams. Temporary Data Sheet 51. Micro Switch.

—113—

SWITCHES—Type D enclosed, front

HARRISON OIL COOLERS



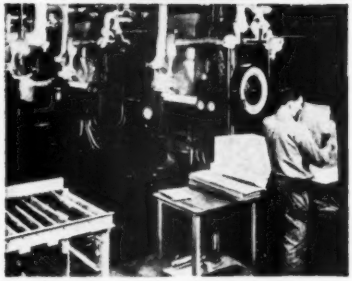
CUT COSTS WITH *Controlled Cooling*

Make machine tools more efficient. Let Harrison analyze your cooling problem on cutting oil, lube oil, hydraulic fluid. Complete testing laboratories assure the *right* Harrison product to meet your needs.

HARRISON

HARRISON RADIATOR DIVISION, GENERAL MOTORS CORPORATION, LOCKPORT, N. Y.

TOLEDOS Printweigh "DRY-ICE"



Accurate printed weights . . . with Toledo Printweigh Scales . . . *control costs* at key points in production of "DRY-ICE" at the Chicago plant of the Pure Carbonic, Incorporated.

Above is the Toledo Automatic Check-Weigher, which checks the weight of each block of packaged ice en route to loading dock. Accuracy here is vital as "DRY-ICE" is priced by weight. The Check-Weigher has a remote head with Printweigh (photo at right) conveniently located in shipping office. This Toledo prints the weight of the blocks on a continuous strip . . . keeps truck shipments straight!

Toledo Printweigh also provides an accurate printed record of the output of hydraulic presses which produce blocks of "DRY-ICE" four times the size of the packaged block (lower right). Keeps production records straight!

More and more today—modern plants look to Toledo all the way to provide the vitally important ACCOUNTING facts on receiving, shipping and production that mean accurate control of inventory, costs and profit! Send for bulletin 2020 . . . a special presentation of Modern Weight Control.

TOLEDO SERVICE as near as your telephone . . . with factory-trained service men in more than 200 cities of United States and Canada.

Toledo Scale Company, Toledo 12, Ohio

TOLEDO

HEADQUARTERS FOR SCALES.

operated. 4-page Bul. TEC-1. Features, uses, construction; capacities, ratings, characteristics. The Trumbull Electric Mfg. Co.

—114—

SWITCHES, CENTRIFUGAL—Bul. 1001, 4 pp., on pilot circuit switches for machine tools, paper mill equipment, processing rolls, conveyor systems, fans, motors. Construction features, operation. Capacity charts, diagrams, photographs. Euclid Electric & Mfg. Co.

—115—

TANKS, ELECTRODIP — Description, photographs, construction data, prices of different models. H. McNaughton Co.

—116—

TESTER, INSULATION RESISTANCE—"The Story of Electrical Insulation Resistance For Practical Men," 24 pp. How to make insulation resistance measurements with a "Megger" instrument, description, photographs, sketches, charts, diagrams. James G. Biddle Co.

—117—

THERMOCOUPLES — Descriptions, prices, recommendations for thermocouples, heat-eyes, lead wire, thermocouple wire, heads, connectors, plug-and-socket assemblies, insulators, protecting tubes. 40-page Bul. T/C 7. Wheelco Instruments Co.

—118—

TOOLS, INSERT—of solid carbide; round, square, triangular, rectangular types; for machining, facing, plunge turning. Sizes, grades, applications for each; specifications, prices. Carboloy Co., Inc.

—119—

TOOLS, PORTABLE ELECTRIC—Bul. JE 1063, 4 pp. Drills, sanders, grinders, polishers, saws. Descriptions, dimensions, specifications, photographs of different types. Independent Pneumatic Tool Co.

—120—

TRANSFORMERS—"butyl-molded" under pressure to hold components in proper relation to each other. Design, construction features, ratings; accuracy charts. Apparatus Dept., General Electric Co.

—121—

TRUCK, HAND—called Twin-Tilt. Features, construction, applications. Photographs. Twin-Tilt Truck Co.

—122—

TRUCKS, BOX—Capacities, dimensions, construction details, sketches of different types. Federal Fibre Corp.

—123—

TRUCKS, MATERIALS HANDLING — 8-page catalog; descriptions, photographs of all models in entire line, physical characteristics, performance figures. Automatic Transportation Co.

—124—

VALVES—Description, capacities, speed control data, photographs, cross-sectional and mounting diagrams, circuits for different types. 16-page Cat. 251. Hanna Engineering Wks.

—125—

VALVES—125(a) Regulating valves for water, steam, air, gas, or oil; float valves. Bul. 10-1, 24 pp. 125(b) Diaphragm control valves, Series 700; pilot piston control valve; venturi throat valve, others. Bul. 700-1, 31 pp. 125(c) "Hi-lift" V-port indicating-type hand control valve, Bul. 242-1, 20 pp. Descriptions, construction, features, sizes, capacities, applications, dimension charts, photographs, schematic drawings on all models. Minneapolis-Honeywell Regulator Co., Belfield Valve Div.

—126—

VALVES, AIR—4-way, for control of double-acting cylinders. Construction, design, operating characteristics of 5 types; photographs, diagrams, dimensions of each. Cat. Sec. 301, 18 pp. Gerotor May Corp.

—127—

VALVES, STAINLESS GATE—"Cooper Alloy Comparison Chart," detailed engineering data of 4 types of valves; construction features, dimensional diagrams of each. The Cooper Alloy Foundry Co.

8 reasons why you should choose Maxi-Power Drives

1. HIGH QUALITY GEARING
Alloy steel gears and pinions with gear teeth generated to greater accuracy. Improved methods of heat-treating give increased strength—longer life.

2. HIGH EFFICIENCY
Antifriction bearings — improved accuracy of gears — maintained accurate alignment —effective lubrication assures operating efficiencies.

3. DEPENDABLE PERFORMANCE
Improved design, rugged construction, highest quality materials, accurate manufacture to close tolerances, all assure extreme ruggedness necessary for heavy-duty service over long periods.

4. SMOOTH OPERATION
The overlapping tooth action of the extremely accurate gears, plus close back lash tolerances, provides smooth, quiet operation.

5. MORE POWER—LESS SPACE
The careful engineering, quality manufacture and the use of finest materials permit the selection of a smaller size unit than was previously necessary.

6. POSITIVE LUBRICATION
All gears and bearings are lubricated from a large oil reservoir by a simple, efficient system. Oil seals at all shaft extensions provide oil-tight construction—clean operation.

7. APPLICATION ADAPTABILITY
Many combinations of shaft assemblies permit a wide variety of arrangements of gear drives between prime mover and driven equipment. Any prime mover may be used.

8. WIDE RANGE OF SIZES AND RATIOS
Single, double, and triple units in a range of 42 sizes. Standard ratios from 2.08 to 1 up to 360 to 1 h.p. up to 1350.

More Power in Less Space
WITH THE NEW MAXI-POWER DRIVES

High quality, rugged dependability characterize this new line of enclosed helical gear drives—Maxi-Power by Foote Bros.

These drives are available in single, double, and triple reductions in a wide range of sizes and ratios.

Mail the coupon for Bulletin or call Foote Bros'. representative in your city.

FOOTE BROS. GEAR AND MACHINE CORPORATION
4545 S. Western Blvd. • Chicago 9, Ill.

FOOTE BROS.

Better Power Transmission Through Better Gears

Foote Bros. Gear and Machine Corporation
Dept. I, 4545 South Western Boulevard, Chicago 9, Illinois

Gentlemen:

Please send me Bulletin on MPA Foote Bros. MAXI-POWER DRIVES

Name .....
Title .....
Company .....
Address .....
City ..... Zone ..... State .....

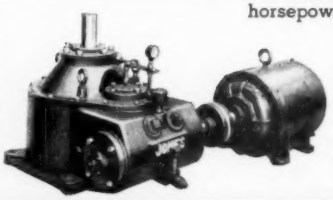
For driving agitators, mixers and similar equipment—

JONES WORM-HELICAL SPEED REDUCERS

HERE is a line of machines that fills a long felt need for double reduction units of the fully enclosed type to be used for agitators, mixers, etc. requiring a vertical shaft drive.

Many of these Jones units have established excellent performance records in a wide variety of service. As a result of that experience a complete standard line has been developed covering 15 standard ratios ranging from 40 to 1 to 250 to 1 for all common motor speeds and a wide range of horsepower ratings.

• This Jones Worm-Helical Speed Reducer on a lacquer agitator is typical of the wide range of services for which these drives can be used such as ore roasters, pulp tank mixers, furnaces, bending rolls and similar applications.



The new Jones Bulletin No. 75 covers complete details on these new Worm-Helical Speed Reducers, with rating tables, dimension diagrams, torque charts and other application information. We shall be pleased to send you a copy.

W. A. JONES FOUNDRY & MACHINE CO.
4433 Roosevelt Road, Chicago, Illinois

Jones

HERRINGBONE—WORM—SPUR—GEAR SPEED REDUCERS • PULLEYS
CUT AND MOLDED TOOTH GEARS • V-BELT SHEAVES • ANTI-FRICTION
PILLOW BLOCKS • FRICTION CLUTCHES • TRANSMISSION APPLIANCES

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with the confidence justified by the offering of these special services nationally.

WHERE TO BUY

Featuring additional products, specialties & services for manufacturing plants

HEAT where and when needed

LEE

DIRECT FIRED WARM AIR HEATERS MEET EVERY NEED FOR HEAT

• for industrial buildings •

- 80-85% EFFICIENT
- AUTOMATIC WITH ANY FUEL
- 300,000 TO 8,000,000 BTU CAPACITY
- FLOOR, WALL OR ROOF MOUNTED
- LARGE CENTRAL HEATERS AND PROCESS HEATERS ALSO AVAILABLE.

WRITE FOR BULLETIN NO. 10

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91 RIVER STREET
HOBOKEN, NEW JERSEY

Est. 1879 ORANGEVILLE Ask For CATALOG

ALL TYPES FLOOR TRUCKS WHEELS CASTERS

ORANGEVILLE MFG. CO.
Orangeville, Zone 4, Penna.

PRINTED CELLOPHANE

Colorful - Self Adhesive - Cellophane, processed in Rolls. Easy to buy - Easy to apply - used for Packaging - Point of Sale advertising - Parts marking and Aircraft Wire terminal identification.

TOPFLIGHT TAPE - YORK, PA.

Let 52,000 Plant Operating Men Decide

If your product sells to the manufacturing industries the full scope of the market can be best determined by the men who might use it. A small ad in this section of FACTORY will search out new uses—new users. The rates are low—the circulation 52,000 ABC—the buying influence of the PLANT OPERATING GROUP unchallenged. *For full details, write today.*

WHERE-TO-BUY

FACTORY MANAGEMENT & MAINTENANCE
330 W. 42nd St., N. Y. 18, N. Y.

EQUIPMENT NEWS

(*Continued from page* 200)

Hand Drier

Electronic hand drier which may be plugged into any circuit, attached to any wall, according to maker, measures 26x14½x11 inches. Said to dry hands in less than 30 seconds; ultra-violet rays "sanitize" hands during process. Drying starts automatically when wet hands are placed in opening and shuts off when the hands are removed. Electronic Towel Corp., 57 William St., New York 5.

•

Fuse and Resistor Locks

Locking device on fuse and resistor clip is said to hold ferrule firmly in place regardless of vibration to maintain an uninterrupted flow of current. Fuse can be removed with a single tip of ejector spring. Clips available in a variety of sizes for electronic or electrical equipment. Raytheon Mfg. Co., Waltham 54, Mass.

•

Reflector Flood Lamp With Mogul Base

Special service 300-watt, R-40 bulb reflector flood lamp has a mogul screw base. Rated at 115, 120, or 125 volts, lamp has an over-all length of 7¼ inches. Average life rating is said to be 1000 hours. Heat-resistant glass bulb designed to resist breakage on contact with water. Westinghouse Electric Corp., Bloomfield, N. J.

•

Wheel Chock

All-welded steel wheel chock for use in holding large truck trailers securely against loading docks is designed to prevent up-ending between docks and trailers. Weight, 6½ pounds, 8 inches high. Nonslip one-piece steel tread plate formed to fit tires; extended shoe on the back is said to prevent slipping on ice. Planet Corp., 704 Sheridan St., Lansing 6, Mich.

•

Rubberized One-Coat Paint

A combination of a rubber base with specially processed oils, one-coat paint is said to be durable, to have good gloss retention, and to be easy to apply. Supplied in white, it can be tinted with oil colors. The Wilbur & Williams Co., Greenleaf & Leon Sts., Boston 15.

•

Nonrepeat Device for Power Presses

Safety device for small bench presses or large floor presses acts as secondary clutch. Downward movement of press ram releases clutch, allowing upper portion of treadle rod to disengage primary clutch on press flywheel. Press will not repeat until the treadle has been brought to the up position. Searjeant Metal Products, Inc., Dept. P-3, Box 101, Mendon, N. Y.

WHERE TO BUY

Featuring additional products, specialties & services for manufacturing plants

MOTORS

NEW IN STOCK

UP TO 200 HORSEPOWER

OPPORTUNITY TO SECURE STANDARD GENERAL PURPOSE MOTORS AT GREATLY REDUCED PRICES.

BREW, WOLTMAN & CO., INC.
46 CHURCH STREET
NEW YORK 7, NEW YORK

FLUX FOR SODERING

SODERING SILVER

BRAZING WELDING

L. B. ALLEN CO., INC.
6781 BRYN MAWR AVE., CHICAGO 31, ILL.

THIS PAGE IS BEING READ!

by most of the 52,000 plant operating men who pay to get FACTORY every month. Your ad in this space will be read by these same important buying influences. Start making sales contact with them at once.

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE:

(Not available for equipment advertising)
$1.50 a line, minimum 4 lines. To figure advance payment count 5 average words as a line.

INDIVIDUAL EMPLOYMENT WANTED undisplayed advertising rate is one-half of above rate, payable in advance.

PROPOSALS, $1.50 a line an insertion.

INFORMATION:

BOX NUMBERS care of publication New York, Chicago or San Francisco offices count as 1 line additional.

DISCOUNT of 10% if full payment is made in advance of four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED RATE:

The advertising rate is $15.00 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches —to a page. F.M.M.

NEW ADVERTISEMENTS received by August 12th will appear in the September issue, subject to limitation of space available

---

MECHANICAL ENGINEER

Unusual opportunity in N.Y.C. with national food concern. Must be M. E. Graduate with experience in designing gas piping systems and burner equipment, process ventilating systems, electrical control and power circuits, heating, drying and heat transfer problems in process operations. Should have had experience in supervising men and be capable of initiating, developing, and executing aforementioned projects. Age approx. 35. Starting salary approx. $450.00 a month, depending upon qualifications. If all specifications can be met, submit detailed resume of work history, education, experience, age, salary expected, date available, etc. to

P-9393 Factory Management & Maintenance
330 W. 42nd Street, New York 18, N. Y.

PROJECT ENGINEER

Graduate Engineer (civil preferred) to work on plant alterations and repairs in N.Y.C. food industry. 15 years in building construction and maintenance, 10 of which must have been in responsible charge of actual building construction (not mechanical end of construction). Age preferred 40-50. Salary approximately $500.00 per month depending on qualifications. Some traveling required. Submit detailed resume of experience, education, age, salary expected and date available, etc. to

P-9395, Factory Management & Maintenance
330 W. 42nd St., New York 18, N. Y.

PACKAGING ENGINEER

Excellent opportunity in N.Y.C. with national food concern. Must be M. E. Graduate and have a sound background and knowledge of automatic machine design as well as a thorough knowledge of packaging equipment and preferably its application to the baking industry. Age 40 to 50. Starting salary approx. $500.00 a month, depending upon qualifications. If all specifications can be met, submit detailed resume of work history, education, experience, age, salary expected, date available, etc. to

P-9394 Factory Management & Maintenance
330 W. 42nd Street, New York 18, N. Y.

SALARIED POSITIONS $3,500—$35,000.

If you are considering a new connection communicate with the undersigned. We offer the original personal employment service (39 years recognized standing and reputation). The procedure, of highest ethical standards, is individualized to your personal requirements and develops avenues without initiative on your part. Your identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, Inc., 276 Dun Bldg., Buffalo 2, N.Y.

EXECUTIVES AND TECHNICAL MEN

Desiring Positions with Stability

We solicit inquiries from qualified candidates who desire to contact employers for positions paying $5000 to $25,000 per year. Confidential Est. 34 years.

(Inquiries from Employers entail no obligation)

THE NATIONAL BUSINESS BOURSE
20 W. Jackson Blvd., Chicago 4

REPLIES (Box No. Address to office nearest you
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITION VACANT

ENGINEERS: FOR professorships all engr. fields. Master's and Doctor's qualify unusually fine positions $4500-$7000, nine months. Instructors, bachelors. Give phone, photo, qualifications. Cline Teachers Agency, East Lansing, Mich.

SELLING OPPORTUNITY OFFERED

WANTED SALESMEN. To sell paints, varnishes and allied products to industrial and institutional trade for a Midwestern manufacturer with 56 years of experience. High quality exceptionally complete line of maintenance products. Plenty of cooperation, permanent, profitable connection, real future with a company you will like to represent. Will consider part time selling application from salesman with non-conflicting line. Give complete detailed information in confidence. SW-8867, Factory Management & Maint.

POSITIONS WANTED

PRODUCTION MANAGER, experienced in all phases of production control. Will guarantee 10 per cent savings. Investigate this guarantee. PW-8540, Factory Management & Maint.

PERSONNEL DIRECTOR—Age 48. Twenty years experience in all phases of personnel functions including labor relations. No preference as to location. Salary open. PW-9344, Factory Management & Maint.

SALES PROMOTIONAL Engineer, technical writer—E. E. Grad. Experienced in engineering to sales liaison work. Fields—electrical control, radio. Will furnish your salesmen with strong selling arguments based on competitive analysis. Samples of work available. PW-9317, Factory Management & Maint.

WAGE AND Salary Administrator—9 years industrial experience, last 5 in installation and maintenance of job evaluation plans covering positions to $10,000 level under all business functions. Also organization analysis, training, methods, wage incentives. M.S. in I.E. PW-9510, Factory Management & Maint.

MANUFACTURING EXECUTIVE—Sound background in management functions and administration as executive assistant to manager. Supervisory experience in industrial engineering including layout, scheduling, time and motion, methods, and production planning. Capable directing complete personnel and employee relations program with good shop knowledge. Aggressive, tactful, cost conscious, and expediter, age 33, college, prefer San Francisco Bay area but consider others including foreign. PW-9414, Factory Management & Maint.

PLANT ENGINEER, B.M.E., 33, married, Registered N. Y. State. Broad experience: maintenance and construction supervision, plant layout and services, administration, stress analyst, steam and power generation, engineering studies. Location immaterial. PW-9412, Factory Management & Maint.

PLANT ENGINEER: 35 years old with Chemical Engineering background wishes immediate connection in plant employing from 300-500 people. 7½ years diversified experience in process equipment, construction and general shop maintenance. PW-9423, Factory Management & Maint.

(Continued on the opposite page)

Factory Mgr. or Supt. Available Sept. 1st

Resourceful, energetic, engineering background, 25 yrs. successful executive experience in all phases of plant management in several types of metal industries. Proven ability to direct key personnel in attaining very efficient with good quality production. Limited to Responsible and Progressive Plants Only. Available to Industrial Consultant Organizations. Minimum Salary $7,000.

PW 9370, Factory, Management & Maintenance
520 N. Michigan Ave., Chicago 11, Illinois

POSITIONS WANTED

ORGANIZER & ADMINISTRATOR

OF MANAGEMENT & LABOR RELATIONS—PERSONNEL RECRUITMENT & TESTS—INDUSTRIAL HYGIENE & MEDICINE — SAFETY — WELFARE — TRAINING—PERSONAL SERVICE EVALUATION—IND. ENGINEERING & MANAGEMENT SURVEYS — RESEARCH — CONTROLS

Married, American Gentile. Full or part-time professional services available. Exceptional opportunity for very large, reputable and progressive ethical concern in New Jersey, Conn. or New York.

PW-9333, Factory Management & Maint.
330 W. 42 St., New York 18, N. Y.

TEN POTENTIAL SUPERVISORS AVAILABLE SEPTEMBER

These men, the first graduates of Southern Technical Institute, a unit of Georgia Tech, have received intensive college training in the functions of factory management. They can perform the functions of management; can coordinate men, materials, machines and methods. They have a knowledge of economic principles, labor policies, personnel problems, mfg. methods, and plant layout. They can perform the functions of management as they concern cost, quality, safety, production and personnel.

Willing to accept a job as a production operator in order to learn YOUR product and processes, if by demonstrating his ability it will be possible to advance to more responsible positions in the future. If you want to place a man in your organization who is capable of developing into a future supervisor or executive, or if you desire additional information, contact:

PROF. F. J. JOHNSON
Southern Tech. Chamblee, Ga.

MOTION ANALYSIS

Teaching the exacting and most effective means of manual method improvement—Constantly improved for over ten years. Vet. Appr.

INDUSTRIAL ENGINEERING COLLEGE
3309 West Washington Boulevard, Dept. F-8
Chicago 24, Illinois

EMPLOYMENT . . . EQUIPMENT . . . BUSINESS
OPPORTUNITIES
Whatever your need—
think "SEARCHLIGHT" FIRST

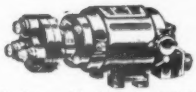
BARGAINS

NEW EQUIPMENT AT SUBSTANTIAL SAVINGS

The easiest way to MAKE MONEY is to SAVE MONEY on your equipment purchases. GROBAN WAR SURPLUS BARGAINS save you 100% to 300%.

Self-Priming ELECTRIC PUMP

$12.95 Postpaid
$51.00 Value



Applications: oil burners, aquariums, fluid metering, fuel pump, tool post grinder, coolant pump, pressure lubricating pump, general industrial, etc. Motor mfd. by Black & Decker; double ball bearing series wound, continuous duty, 1/30 H.P. electric motor rated 12,000 R.P.M. Transformer included for use on 110 V AC current. Also applicable for 24-32 V DC. Pump mfd. by Weldon Tool Co. with standard ¼" tubing ports; rated 2 G.P.M.; remote pump and use motor as high speed grinder. Overall dimensions: 7¾" long x 3¼" wide x 3¼" high. Approx. wt. 5 lbs.

Screw Jack

Ideal for raising, lowering, leveling and adjusting. Use on tables, machine tools, etc. Overall length closed: 9 inches. Open: 14 inches. Worm Gearbox with 54 to 1 reduction, with double end drive shaft. Extension screw shaft 30 to 1 reduction. An outstanding buy for

$3.95 Postpaid
A $12.00 Value

This New PRESS

Double - Action
Pneumatic - Hydraulic

Uses air or oil. Ideal as punch press, vise, arbor press, etc. Excellent for industrial and shop use. Use 150 lbs. air pressure or 250 lbs. oil pressure. Cushioned double action "Logan" Model AC ram, 6" bore and 6" stroke. Capable of up to 4200 lbs. of pressure using air. Has 3" throat. Lubricated gibs provide perfect alignment. Has adjustable work space. Hardened alloy steel piston rod 1" diameter. Frame made of cast steel with ¾" base plate. Manufactured by Sipp-Eastwood Co. 19" high. Base, 9½" wide by 18" deep. Wt. Approx 300 lbs.

$300 VALUE as appraised by Govt.

F.O.B. Chicago Only
$79.50

STENCIL OUTFIT

1 stencil brush; 1 can paint, stencil paste, 1 complete set of metal letters, figures, punctuation and spacers. Saves time, money and effort, easy to use, pays for itself. Metal letters, INTERLOCKING to make words. Comes in handy wooden box with sliding top. Ideal for marking boxes and packages, identifying inventory, numbering doors, etc. GUARANTEED. Complete kit with 1" letters.

$2.50 Prepaid
A $10.00 Value

Metal Die Stamping KIT

$6.75 Prepaid in U.S.
A $12.00 Value
In ⅜" letters $7.95

New 28 piece set-stamp letters or name on steel, iron and other metals—mark, identify and stamp tools, equipment, etc. Use in shop, on farm, in factory—anywhere. Complete alphabet, etc. In fine fitted wooden box with cover. ¾" letters, ⅜" length. Lifetime service. Countless uses.

GROBAN SUPPLY CO.

1507 SOUTH MICHIGAN AVE.
Chicago 5, Ill. Dept. FMM-8

FREE CATALOG

Get new Groban War Surplus Bargain catalog, features water pumps, hydraulic pumps, hydraulic control valves, tanks, motors, flood lights, other items and valuable hydraulic data. INVESTIGATE. WE HELP YOU CUT COSTS.

POSITIONS WANTED

(Continued from opposite page)

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22 YEARS Industrial Engineering, Manufacturing and Management experience; consulting basis; special assignments, partially independent and top management engineering firms; directed 1,000,000. Cost reduction program 20 months; production planning, scheduling, material, inventory controls, plant layouts, time and motion study with installation and supervision of such departments and personnel training; development of standard data and costs methods and procedure control, shop and office; wage incentive installation, direct and indirect labor; job evaluation, in metal working, fabrication, job shop, assembly, woodworking furniture, automotive refrigeration, meat and perishable food processing, paper products, glass, textile—ferrous and non-ferrous, wire drawing industries. PW-9511, Factory Management & Maint.

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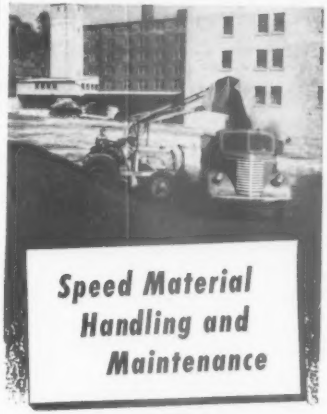

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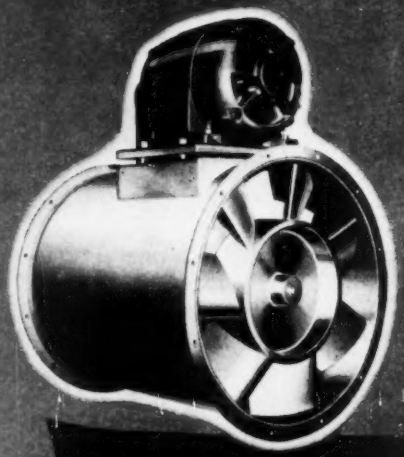

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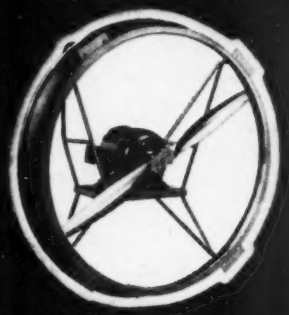

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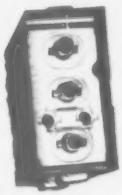

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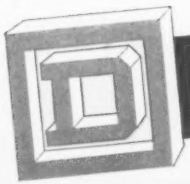

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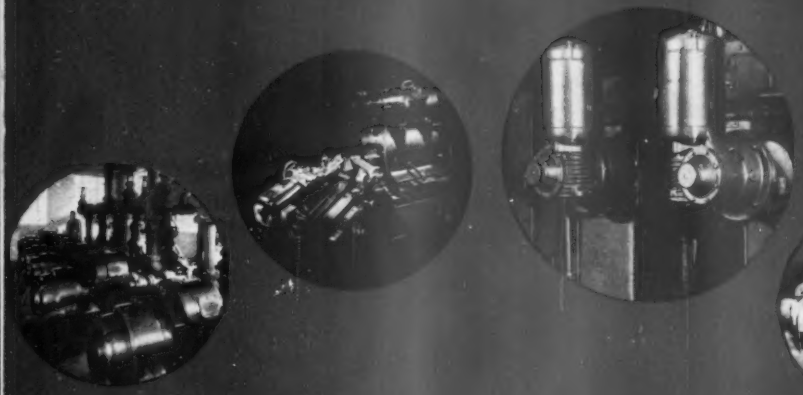

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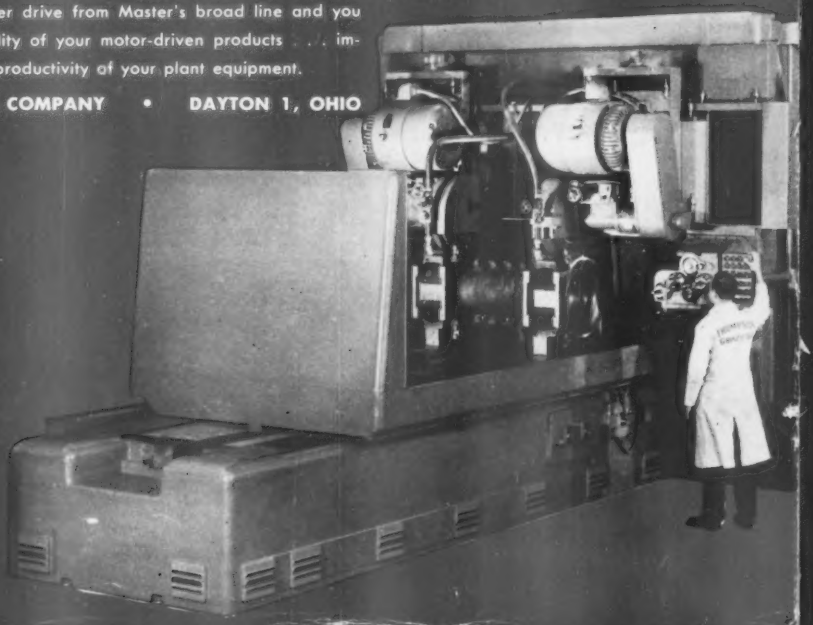
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